

# RSI, 1.5-250 kW (2-350 hp)

Installation and operating instructions



## RSI, 1.5-250 kW (2-350 hp)

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## English (GB) Installation and operating instructions

### Original installation and operating instructions

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## 1. General information



Read this document before you install the product. Installation and operation must comply with local regulations and accepted codes of good practice.

### 1.1 Hazard statements

The symbols and hazard statements below may appear in Grundfos installation and operating instructions, safety instructions and service instructions.



#### DANGER

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



#### WARNING

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



#### CAUTION

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

The hazard statements are structured in the following way:



#### SIGNAL WORD

##### Description of the hazard

Consequence of ignoring the warning

- Action to avoid the hazard.

### 1.2 Notes

The symbols and notes below may appear in Grundfos installation and operating instructions, safety instructions and service instructions.



Observe these instructions for explosion-proof products.



A blue or grey circle with a white graphical symbol indicates that an action must be taken.



A red or grey circle with a diagonal bar, possibly with a black graphical symbol, indicates that an action must not be taken or must be stopped.



If these instructions are not observed, it may result in malfunction or damage to the equipment.



Tips and advice that make the work easier.

## 2. Receiving the product



Check the condition of the inverter before installation. Do not install the inverter if the equipment appears to be damaged.

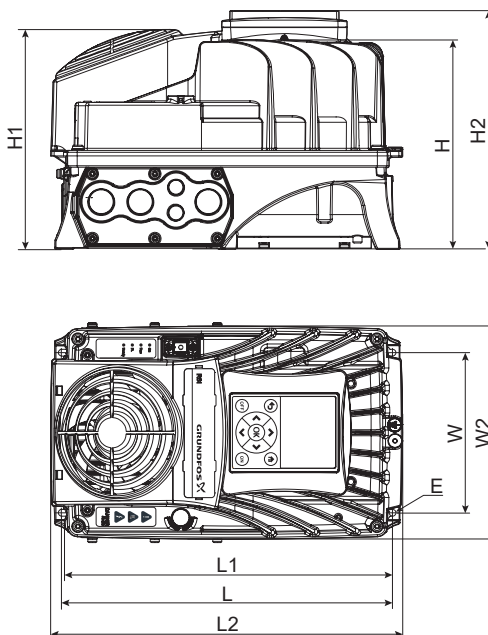
In case of any deviation from the order, contact Grundfos immediately. Once you get the product, perform the following inspections before installation:

- Make sure the product corresponds to the order.
- Check for any visual damage or scratch.
- Make sure the list of components and accessories is complete.
- Make sure that the fastening parts are tightened properly.

### 3. Technical data

#### 3.1 Product range

##### 3.1.1 Dimensions

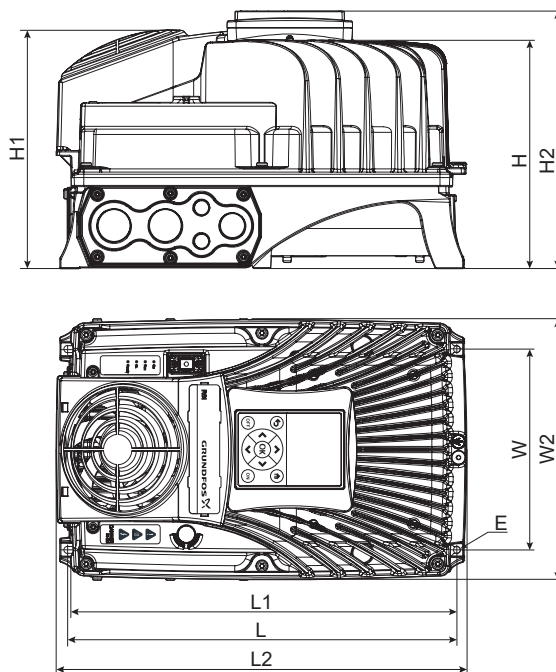


Frame A 1.5 - 5.5 kW (2 - 7.5 hp)

| Frame size | Product                  |                   |                   |                    |                   |                    |                    |                   |                    |                    |
|------------|--------------------------|-------------------|-------------------|--------------------|-------------------|--------------------|--------------------|-------------------|--------------------|--------------------|
|            | Net weight<br>[kg (lbs)] | E<br>[mm<br>(in)] | W<br>[mm<br>(in)] | W2<br>[mm<br>(in)] | L<br>[mm<br>(in)] | L1<br>[mm<br>(in)] | L2<br>[mm<br>(in)] | H<br>[mm<br>(in)] | H1<br>[mm<br>(in)] | H2<br>[mm<br>(in)] |
| Frame A    | 8.8 (19)                 | Ø5.9<br>(0.23)    | 143.5<br>(5.7)    | 191<br>(7.5)       | 297<br>(11.7)     | 293<br>(11.5)      | 315<br>(12.4)      | 188<br>(7.4)      | 197<br>(7.8)       | 214<br>(8.4)       |

| Frame size | Package                    |                     |                    |                     |
|------------|----------------------------|---------------------|--------------------|---------------------|
|            | Gross weight<br>[kg (lbs)] | Length<br>[mm (in)] | Width<br>[mm (in)] | Height<br>[mm (in)] |
| Frame A    | 310 (683)                  | 250 (9.8)           | 200 (7.9)          | 295 (11.6)          |

TM066526

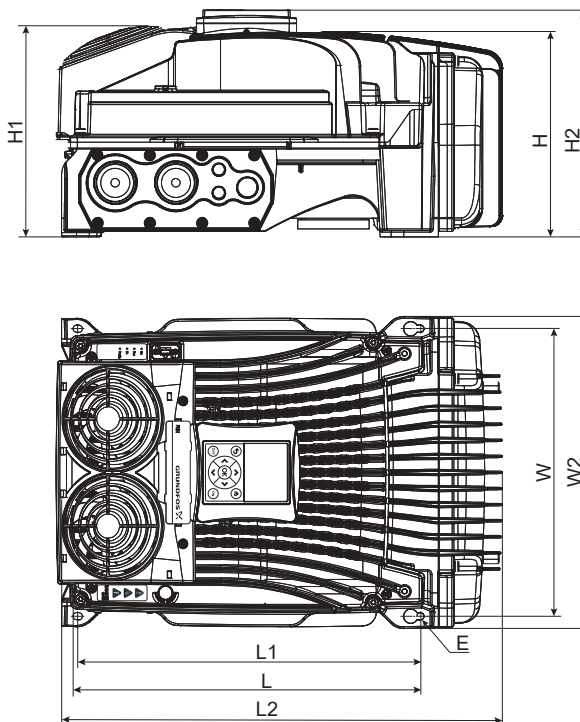


TM066527

Frame B 7.5 - 15 kW (10-20 hp)

| Product    |                          |                   |                   |                    |                   |                    |                    |                   |                    |                    |
|------------|--------------------------|-------------------|-------------------|--------------------|-------------------|--------------------|--------------------|-------------------|--------------------|--------------------|
| Frame size | Net weight<br>[kg (lbs)] | E<br>[mm<br>(in)] | W<br>[mm<br>(in)] | W2<br>[mm<br>(in)] | L<br>[mm<br>(in)] | L1<br>[mm<br>(in)] | L2<br>[mm<br>(in)] | H<br>[mm<br>(in)] | H1<br>[mm<br>(in)] | H2<br>[mm<br>(in)] |
| Frame B    | 15 (33)                  | Ø6.1<br>(0.24)    | 180<br>(7.1)      | 233<br>(9.2)       | 349<br>(13.7)     | 345.2<br>(13.6)    | 368<br>(14.5)      | 204<br>(8.0)      | 214<br>(8.4)       | 231<br>(9.1)       |

| Package    |                            |                     |                    |                     |
|------------|----------------------------|---------------------|--------------------|---------------------|
| Frame size | Gross weight<br>[kg (lbs)] | Length<br>[mm (in)] | Width<br>[mm (in)] | Height<br>[mm (in)] |
| Frame B    | 310 (683)                  | 250 (9.8)           | 200 (7.9)          | 295 (11.6)          |

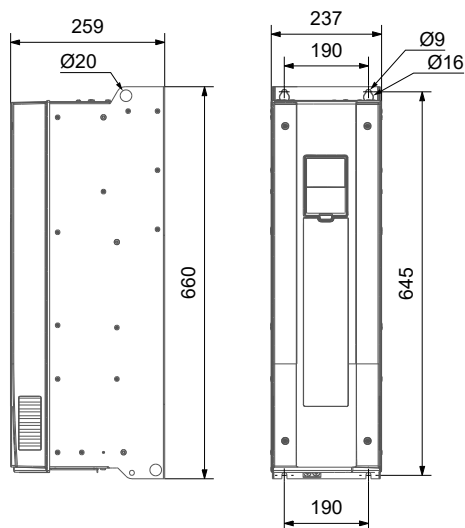


TM066528

Frame C 18.5 - 37 kW (25-50 hp)

| Product    |                          |                   |                   |                    |                   |                    |                    |                   |                    |                    |
|------------|--------------------------|-------------------|-------------------|--------------------|-------------------|--------------------|--------------------|-------------------|--------------------|--------------------|
| Frame size | Net weight<br>[kg (lbs)] | E<br>[mm<br>(in)] | W<br>[mm<br>(in)] | W2<br>[mm<br>(in)] | L<br>[mm<br>(in)] | L1<br>[mm<br>(in)] | L2<br>[mm<br>(in)] | H<br>[mm<br>(in)] | H1<br>[mm<br>(in)] | H2<br>[mm<br>(in)] |
| Frame C    | 32 (69)                  | Ø8.2<br>(0.32)    | 322<br>(12.7)     | 350<br>(13.8)      | 385<br>(15.2)     | 382.5<br>(15.1)    | 500<br>(19.7)      | 230<br>(9.1)      | 236<br>(9.3)       | 254 (10)           |

| Package    |                            |                     |                    |                     |
|------------|----------------------------|---------------------|--------------------|---------------------|
| Frame size | Gross weight<br>[kg (lbs)] | Length<br>[mm (in)] | Width<br>[mm (in)] | Height<br>[mm (in)] |
| Frame C    | 310 (683)                  | 250 (9.8)           | 200 (7.9)          | 295 (11.6)          |



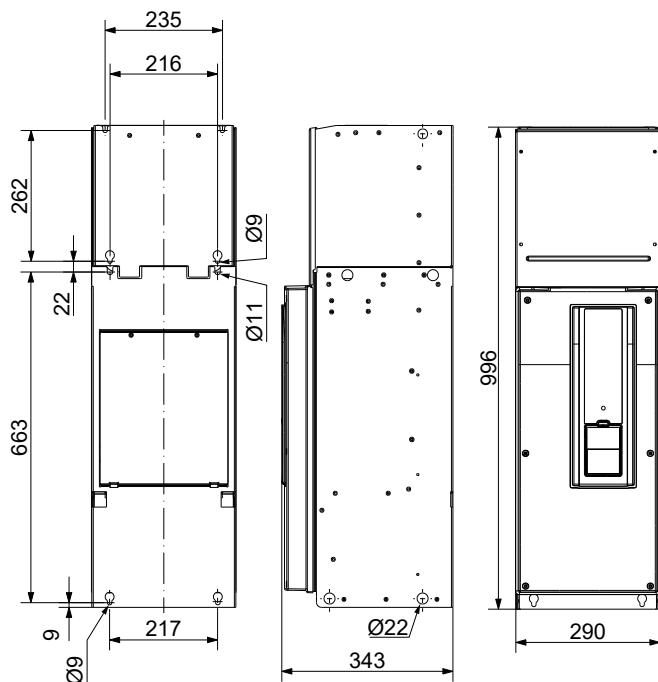
TM075444

Frame MR7 45-55 kW (60-74 hp)

| Frame size | Product                 |                |                 |                 |                |                 |                |                 |                 |
|------------|-------------------------|----------------|-----------------|-----------------|----------------|-----------------|----------------|-----------------|-----------------|
|            | Net weight<br>[kg (lb)] | E<br>[mm (in)] | E1<br>[mm (in)] | E2<br>[mm (in)] | W<br>[mm (in)] | W2<br>[mm (in)] | L<br>[mm (in)] | L2<br>[mm (in)] | H2<br>[mm (in)] |
| Frame MR7  | 37.5<br>(82.67)         | Ø9<br>(0.35)   | Ø16<br>(0.63)   | Ø20<br>(0.79)   | 190<br>(7.48)  | 237<br>(9.33)   | 645<br>(25.39) | 660<br>(25.98)  | 259<br>(10.20)  |

| Frame size | Package                   |                  |                 |                  |
|------------|---------------------------|------------------|-----------------|------------------|
|            | Gross weight<br>[kg (lb)] | Length [mm (in)] | Width [mm (in)] | Height [mm (in)] |
| Frame MR7  | 40.5 (89.29)              | 320 (12.60)      | 330 (12.99)     | 750 (29.53)      |



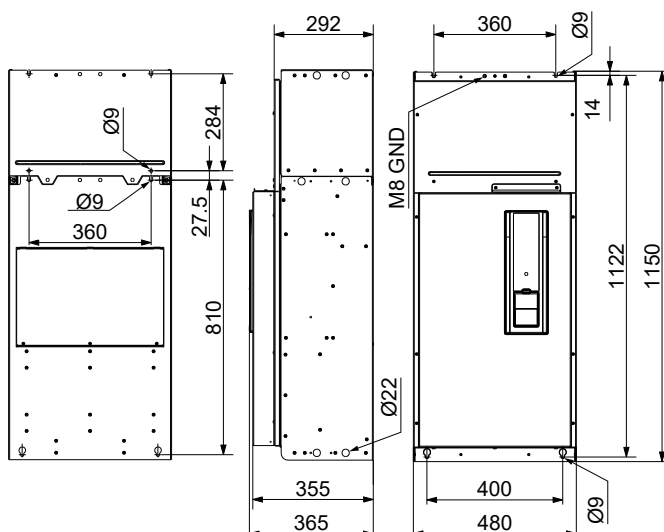


Frame MR8 110 kW (148 hp)

TM075445

| Frame size | Product                 |                |                 |                 |                |                 |                 |                 |                |                 |                 |                 |
|------------|-------------------------|----------------|-----------------|-----------------|----------------|-----------------|-----------------|-----------------|----------------|-----------------|-----------------|-----------------|
|            | Net weight<br>[kg (lb)] | E<br>[mm (in)] | E1<br>[mm (in)] | E2<br>[mm (in)] | W<br>[mm (in)] | W1<br>[mm (in)] | W2<br>[mm (in)] | W3<br>[mm (in)] | L<br>[mm (in)] | L2<br>[mm (in)] | L3<br>[mm (in)] | H2<br>[mm (in)] |
| Frame MR8  | 66<br>(145.50)          | Ø9<br>(0.35)   | Ø11<br>(0.43)   | Ø22<br>(0.87)   | 217<br>(8.54)  | 216<br>(8.50)   | 290<br>(11.42)  | 235<br>(9.25)   | 663<br>(26.10) | 996<br>(39.21)  | 262<br>(10.31)  | 343<br>(13.50)  |

| Frame size | Package                |                  |                 |                  |
|------------|------------------------|------------------|-----------------|------------------|
|            | Gross weight [kg (lb)] | Length [mm (in)] | Width [mm (in)] | Height [mm (in)] |
| Frame MR8  | 80.5 (177.47)          | 540 (21.26)      | 430 (16.93)     | 1140 (44.88)     |

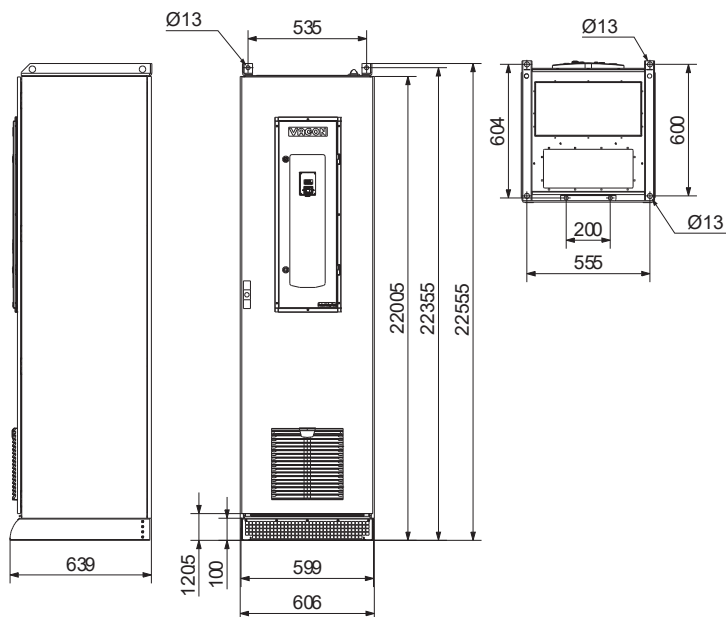


TM075446

Frame MR9 132- 160 kW (177-215 hp)

| Product    |                            |                   |                    |                   |                    |                    |                   |                    |                    |                    |                   |                    |                    |
|------------|----------------------------|-------------------|--------------------|-------------------|--------------------|--------------------|-------------------|--------------------|--------------------|--------------------|-------------------|--------------------|--------------------|
| Frame size | Net weight<br>[kg<br>(lb)] | E<br>[mm<br>(in)] | E1<br>[mm<br>(in)] | W<br>[mm<br>(in)] | W1<br>[mm<br>(in)] | W2<br>[mm<br>(in)] | L<br>[mm<br>(in)] | L1<br>[mm<br>(in)] | L2<br>[mm<br>(in)] | L3<br>[mm<br>(in)] | H<br>[mm<br>(in)] | H1<br>[mm<br>(in)] | H2<br>[mm<br>(in)] |
| Frame MR9  | 119.50<br>(263.45)         | Ø9<br>(0.35)      | Ø22<br>(0.87)      | 400<br>(15.75)    | 360<br>(14.17)     | 480<br>(18.90)     | 1122<br>(44.17)   | 810<br>(31.89)     | 1150<br>(45.28)    | 284<br>(11.18)     | 355<br>(13.98)    | 292<br>(11.50)     | 365<br>(14.37)     |

| Package    |                           |                     |                    |                     |
|------------|---------------------------|---------------------|--------------------|---------------------|
| Frame size | Gross weight<br>[kg (lb)] | Length<br>[mm (in)] | Width<br>[mm (in)] | Height<br>[mm (in)] |
| Frame MR9  | 148.00<br>(326.28)        | 570<br>(22.44)      | 730<br>(28.74)     | 1300<br>(51.18)     |



TM075727

Frame ED 200-250 kW (268-335 hp)

| Frame size | Product                 |                   |                   |                    |                    |                   |                    |                    |                   |                    |                    |
|------------|-------------------------|-------------------|-------------------|--------------------|--------------------|-------------------|--------------------|--------------------|-------------------|--------------------|--------------------|
|            | Net weight<br>[kg (lb)] | E<br>[mm<br>(in)] | W<br>[mm<br>(in)] | W1<br>[mm<br>(in)] | W2<br>[mm<br>(in)] | L<br>[mm<br>(in)] | L1<br>[mm<br>(in)] | L2<br>[mm<br>(in)] | H<br>[mm<br>(in)] | H1<br>[mm<br>(in)] | H2<br>[mm<br>(in)] |
| Frame ED   | 200 kW: 280<br>(617.29) | Ø13               | 535               | 599                | 606                | 2235.5            | 2200.5             | 2255.5             | 600               | 604                | 639                |
|            | 250 kW: 420<br>(925.94) | (0.51)            | (21.06)           | (23.58)            | (23.86)            | (88.01)           | (86.63)            | (88.80)            | (23.62)           | (23.78)            | (25.16)            |

| Frame size | Package                   |                     |                    |                      |
|------------|---------------------------|---------------------|--------------------|----------------------|
|            | Gross weight<br>[kg (lb)] | Length<br>[mm (in)] | Width<br>[mm (in)] | Height<br>[mm (in)]  |
| Frame ED   | 200 kW: 351 (773.82)      | 880                 | 800                | 200 kW: 1300 (51.18) |
|            | 250 kW: 491 (1082.47)     | (34.65)             | (31.50)            | 250 kW: 2450 (96.46) |

## 3.2 Technical data

| Voltage                  |                             |           | 3 × 208-240 V | 3 × 380-440 V |
|--------------------------|-----------------------------|-----------|---------------|---------------|
| Installation environment | Minimum ambient temperature | [°C (°F)] | -10 (14)      | -10 (14)      |
|                          | Maximum ambient temperature | [°C (°F)] | 60 (140)      | 60 (140)      |
|                          | Maximum relative humidity   | [%]       | 100           | 100           |
| Electrical data          | Minimum MPP voltage         | [VDC]     | 230           | 450           |
|                          | Recommended MPP voltage     | [VDC]     | 290-336       | 530-615       |
|                          | Maximum input voltage       | [VDC]     | 400           | 800           |
|                          | Input voltage               | [VAC]     | 208-240       | 380-480       |
|                          | Rated output voltage        | [VAC]     | 208-240       | 380-440       |
|                          | Minimum frequency           | [Hz]      | 5             | 5             |
|                          | Maximum frequency           | [Hz]      | 160           | 160           |
|                          | Phases                      |           | 3             | 3             |
|                          | Enclosure class             |           | IP66          | IP54, IP66    |

### 3.2.1 Low voltage range (3 × 208-240 V)

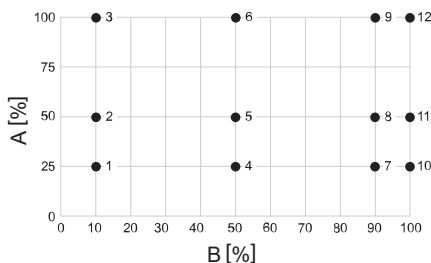
| Power<br>[kW (hp)] | Product number | Electrical data      |                             | Frame size |
|--------------------|----------------|----------------------|-----------------------------|------------|
|                    |                | Max. P2<br>[kW (hp)] | Rated output current<br>[A] |            |
| 1.5 (2)            | 99090622       | 1.5 (2)              | 8                           | A          |
| 2.2 (3)            | 99090633       | 2.2 (3)              | 11                          | A          |
| 3.0 (4)            | 99090634       | 3.0 (4)              | 12.5                        | A          |
| 4.0 (5)            | 99090635       | 4.0 (5)              | 18                          | B          |
| 5.5 (7.5)          | 99090636       | 5.5 (7.5)            | 24.2                        | B          |
| 7.5 (10)           | 99090637       | 7.5 (10)             | 31                          | B          |
| 11 (15)            | 99090638       | 11 (15)              | 48                          | C          |
| 15 (20)            | 99090639       | 15 (20)              | 62                          | C          |

### 3.2.2 High voltage range (3 × 380-440 V)

| Power<br>[kW] | Product number | Electrical data      |                             | Frame size |
|---------------|----------------|----------------------|-----------------------------|------------|
|               |                | Max. P2<br>[kW (hp)] | Rated output current<br>[A] |            |
| 2.2 (3)       | 99044348       | 2.2 (3)              | 5.6                         | A          |
| 3.0 (4)       | 99044349       | 3.0 (4)              | 8                           | A          |
| 4.0 (5)       | 99044350       | 4.0 (5)              | 9.6                         | A          |
| 5.5 (7.5)     | 99044351       | 5.5 (7.5)            | 12                          | A          |
| 7.5 (10)      | 99044352       | 7.5 (10)             | 16                          | B          |
| 11 (15)       | 99044363       | 11 (15)              | 23                          | B          |
| 15 (20)       | 99044364       | 15 (20)              | 31                          | B          |
| 18.5 (25)     | 99044365       | 18.5 (25)            | 38                          | C          |
| 22 (30)       | 99044366       | 22 (30)              | 46                          | C          |
| 30 (40)       | 99044367       | 30 (40)              | 61                          | C          |
| 37 (50)       | 99044368       | 37 (50)              | 72                          | C          |
| 45 (60)       | 99648886       | 45 (60)              | 87                          | MR7        |
| 55 (74)       | 99648887       | 55 (74)              | 105                         | MR7        |
| 110 (148)     | 99648888       | 110 (148)            | 205                         | MR8        |
| 132 (177)     | 99648889       | 132 (177)            | 261                         | MR9        |
| 160 (215)     | 99648890       | 160 (215)            | 310                         | MR9        |
| 200 (268)     | 99648891       | 200 (268)            | 385                         | ED         |
| 250 (335)     | 99648892       | 250 (335)            | 460                         | ED         |

### 3.2.3 Drive efficiency (CDM)

The IE classification of the complete drive module (CDM) is based on the drive losses. The loss determination is based on factory settings such as the default switching frequency. The efficiency of RSI is determined as efficiency class IE2 according to EN 50598-2 and IEC 61800-9.



TM079893

Different operating points of RSI depending on the relative torque-producing current and the relative motor stator frequency

| Pos. | Description                       |
|------|-----------------------------------|
| A    | Relative torque-producing current |
| B    | Relative motor stator frequency   |

#### Efficiencies and standby losses of RSI at different operating points

#### Drive efficiencies for low voltage range (3 × 208-240 V), IP66 variant

| Variant,<br>power<br>[kW (hp)] | Apparent<br>power<br>[kVA] | Nominal<br>current<br>[A] | Standby<br>losses<br>[W] | Frequency[%]    |      |      |      |      |      |      |      |      |      |      |      |
|--------------------------------|----------------------------|---------------------------|--------------------------|-----------------|------|------|------|------|------|------|------|------|------|------|------|
|                                |                            |                           |                          | 10              | 10   | 10   | 50   | 50   | 50   | 90   | 90   | 90   | 100  | 100  | 100  |
|                                |                            |                           |                          | Current [%]     |      |      |      |      |      |      |      |      |      |      |      |
|                                |                            |                           |                          | 25              | 50   | 100  | 25   | 50   | 100  | 25   | 50   | 100  | 25   | 50   | 100  |
|                                |                            |                           |                          | Operating point |      |      |      |      |      |      |      |      |      |      |      |
|                                |                            |                           |                          | 1               | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 10   | 11   | 12   |
| Relative losses [%]            |                            |                           |                          |                 |      |      |      |      |      |      |      |      |      |      |      |
| 1.5 (2)                        | 3.2                        | 8                         | 14                       | 1.89            | 2.10 | 2.61 | 1.94 | 2.23 | 2.93 | 2.00 | 2.43 | 3.46 | 2.01 | 2.46 | 3.58 |
| 2.2 (3)                        | 4.4                        | 11                        | 14                       | 1.62            | 1.86 | 2.42 | 1.69 | 2.01 | 2.81 | 1.74 | 2.24 | 3.49 | 1.76 | 2.29 | 3.66 |
| 3.0 (4)                        | 5.0                        | 12.5                      | 14                       | 1.55            | 1.79 | 2.39 | 1.61 | 1.95 | 2.81 | 1.65 | 2.21 | 3.56 | 1.67 | 2.27 | 3.74 |
| 4.0 (5)                        | 7.2                        | 18                        | 14                       | 1.36            | 1.57 | 2.06 | 1.42 | 1.69 | 2.34 | 1.47 | 1.85 | 2.76 | 1.48 | 1.90 | 2.87 |
| 5.5 (7.5)                      | 9.6                        | 24.2                      | 14                       | 1.04            | 1.29 | 2.00 | 1.10 | 1.42 | 2.35 | 1.14 | 1.61 | 2.93 | 1.15 | 1.65 | 3.07 |
| 7.5 (10)                       | 12.3                       | 31                        | 14                       | 0.97            | 1.23 | 1.99 | 1.03 | 1.37 | 2.40 | 1.07 | 1.59 | 3.10 | 1.09 | 1.64 | 3.27 |
| 11 (15)                        | 19.1                       | 48                        | 18                       | 1.07            | 1.32 | 2.04 | 1.13 | 1.46 | 2.42 | 1.18 | 1.65 | 3.04 | 1.19 | 1.70 | 3.19 |
| 15 (20)                        | 24.7                       | 62                        | 18                       | 0.99            | 1.26 | 2.03 | 1.06 | 1.41 | 2.47 | 1.11 | 1.64 | 3.23 | 1.12 | 1.69 | 3.42 |

**Drive efficiencies for high voltage range (3 × 380-440 V), IP21, IP54, and IP66 variants**

| Variant,<br>power<br>[kW (hp)] | Apparent<br>power<br>[kVA] | Nominal<br>current<br>[A] | Standby<br>losses<br>[W] | Frequency[%]    |      |      |      |      |      |      |      |      |      |      |      |
|--------------------------------|----------------------------|---------------------------|--------------------------|-----------------|------|------|------|------|------|------|------|------|------|------|------|
|                                |                            |                           |                          | 10              | 10   | 10   | 50   | 50   | 50   | 90   | 90   | 90   | 100  | 100  | 100  |
|                                |                            |                           |                          | Current [%]     |      |      |      |      |      |      |      |      |      |      |      |
|                                |                            |                           |                          | 25              | 50   | 100  | 25   | 50   | 100  | 25   | 50   | 100  | 25   | 50   | 100  |
|                                |                            |                           |                          | Operating point |      |      |      |      |      |      |      |      |      |      |      |
|                                |                            |                           |                          | 1               | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 10   | 11   | 12   |
| Relative losses [%]            |                            |                           |                          |                 |      |      |      |      |      |      |      |      |      |      |      |
| 2.2 (3)                        | 3.9                        | 5.6                       | 14                       | 1.46            | 1.61 | 1.93 | 1.50 | 1.67 | 2.08 | 1.52 | 1.76 | 2.32 | 1.52 | 1.77 | 2.38 |
| 3 (4)                          | 5.5                        | 8.0                       | 14                       | 1.21            | 1.35 | 1.70 | 1.24 | 1.43 | 1.88 | 1.27 | 1.54 | 2.19 | 1.28 | 1.56 | 2.26 |
| 4 (5)                          | 6.7                        | 9.6                       | 14                       | 1.11            | 1.26 | 1.63 | 1.15 | 1.35 | 1.83 | 1.17 | 1.47 | 2.18 | 1.17 | 1.51 | 2.27 |
| 5.5 (7.5)                      | 8.3                        | 12                        | 14                       | 0.88            | 1.05 | 1.58 | 0.91 | 1.14 | 1.84 | 0.94 | 1.28 | 2.31 | 0.95 | 1.32 | 2.43 |
| 7.5 (10)                       | 11.1                       | 16                        | 14                       | 0.79            | 0.95 | 1.42 | 0.82 | 1.03 | 1.61 | 0.85 | 1.13 | 1.92 | 0.86 | 1.15 | 2.00 |
| 11 (15)                        | 15.9                       | 23                        | 14                       | 0.70            | 0.87 | 1.38 | 0.73 | 0.95 | 1.62 | 0.75 | 1.08 | 2.02 | 0.76 | 1.11 | 2.11 |
| 15 (20)                        | 21.5                       | 31                        | 14                       | 0.68            | 0.87 | 1.41 | 0.72 | 0.95 | 1.64 | 0.74 | 1.08 | 2.04 | 0.75 | 1.11 | 2.14 |
| 18.5 (25)                      | 26.3                       | 38                        | 18                       | 0.79            | 0.97 | 1.51 | 0.82 | 1.05 | 1.74 | 0.85 | 1.18 | 2.14 | 0.85 | 1.20 | 2.23 |
| 22 (30)                        | 31.9                       | 46                        | 18                       | 0.77            | 0.95 | 1.48 | 0.80 | 1.03 | 1.68 | 0.82 | 1.14 | 2.03 | 0.83 | 1.16 | 2.11 |
| 30 (40)                        | 42.3                       | 61                        | 18                       | 0.71            | 0.90 | 1.46 | 0.75 | 0.99 | 1.70 | 0.77 | 1.12 | 2.13 | 0.78 | 1.15 | 2.24 |
| 37 (50)                        | 49.9                       | 72                        | 18                       | 0.69            | 0.89 | 1.47 | 0.72 | 0.98 | 1.74 | 0.75 | 1.12 | 2.24 | 0.76 | 1.16 | 2.36 |
| 45 (60)                        | 60.3                       | 87                        | 31                       | 0.57            | 0.76 | 1.36 | 0.60 | 0.83 | 1.54 | 0.63 | 0.93 | 1.79 | 0.63 | 0.95 | 1.86 |
| 55 (74)                        | 72.7                       | 105                       | 31                       | 0.55            | 0.76 | 1.41 | 0.59 | 0.84 | 1.61 | 0.62 | 0.94 | 1.90 | 0.62 | 0.96 | 1.97 |
| 110 (148)                      | 142.0                      | 205                       | 46                       | 0.51            | 0.71 | 1.39 | 0.55 | 0.79 | 1.57 | 0.57 | 0.88 | 1.85 | 0.58 | 0.90 | 1.92 |
| 132 (177)                      | 180.8                      | 261                       | 45                       | 0.59            | 0.79 | 1.43 | 0.63 | 0.86 | 1.60 | 0.65 | 0.95 | 1.84 | 0.66 | 0.97 | 1.90 |
| 160 (215)                      | 214.8                      | 310                       | 45                       | 0.57            | 0.79 | 1.50 | 0.61 | 0.86 | 1.68 | 0.64 | 0.96 | 1.95 | 0.64 | 0.98 | 2.01 |
| 200 (268)                      | 266.7                      | 385                       | 45                       | 0.44            | 0.63 | 1.27 | 0.47 | 0.70 | 1.44 | 0.50 | 0.80 | 1.72 | 0.50 | 0.82 | 1.79 |
| 250 (335)                      | 318.7                      | 460                       | 90                       | 0.51            | 0.68 | 1.19 | 0.55 | 0.76 | 1.37 | 0.58 | 0.85 | 1.61 | 0.58 | 0.87 | 1.66 |

## 4. Installing the product



### DANGER

Death or serious personal injury

- Before installation, make sure that the power supply is switched off and it cannot be switched on unintentionally.



### WARNING

Death or serious personal injury

- Installation must be carried out by qualified staff.



### WARNING

Death or serious personal injury

- Use appropriate tools and safety equipment when handling the product.



### CAUTION

Minor or moderate personal injury

- Use a proper lifting method when necessary.



### CAUTION

Minor or moderate personal injury

- Ensure that the mounting wall can support the weight of the inverter. See the weight in [3.2 Technical data](#).

### Related information

[3.2 Technical data](#)

[4.1 Installation example](#)

### Electro-magnetic compatibility (EMC)

The drive must comply with the standard IEC 61000-3-12. The short-circuit power SSC must be a minimum of 120 RSCE at the interface point between your and the public mains. Make sure to connect the drive and the motor to the mains with a short-circuit power SSC that is a minimum of 120 RSCE. If necessary, contact your mains operator.

### Using an RCD or an RCM device

The drive can cause a current in the protective grounding conductor. Use a residual current-operated protective (RCD) device, or a residual current-operated monitoring (RCM) device to give protection against a direct or an indirect contact. Use a type B RCD or RCM device on the mains side of the drive.



Adjust the minimum frequency to a value that ensures water is discharged from the outlet of the pump.



To adjust the minimum frequency, click the Home button on the control panel and select minimum frequency.

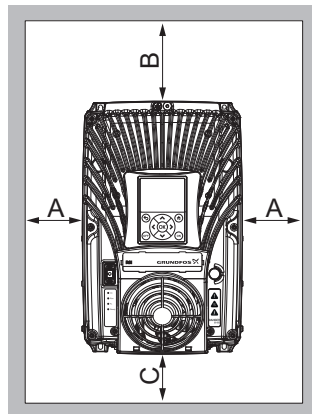
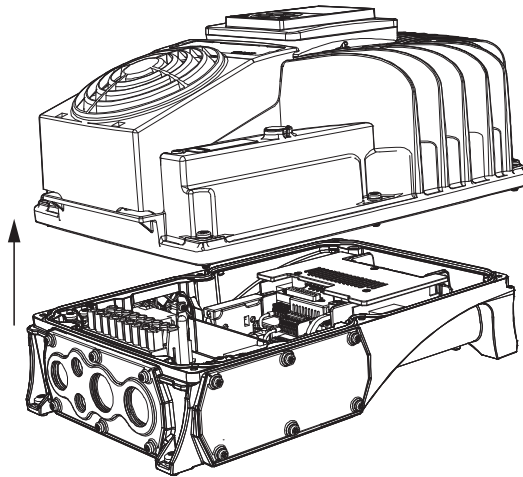


To ensure a proper convective cooling effect, install the RSI according to fig. Installation example showing the required clearance when mounting the product.

Do not install the equipment in direct sunlight.



## 4.1 Installation example



*Installation example showing the required clearance when mounting the product*

| Min. clearance [mm] |    |     |    |
|---------------------|----|-----|----|
| Type                | A  | B   | C  |
| All types           | 80 | 160 | 60 |

A = Clearance left and right from the drive

B = Clearance above the drive

C = Clearance underneath the AC drive drive

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## 4.2 Electrical connection

### WARNING

Death or serious personal injury



- To avoid the risk of electric shock or fire, make sure that the power supply has been switched off before connecting the equipment, and make sure the earth terminal is reliably grounded.

### WARNING

Death or serious personal injury



- Make sure that reinforced protective ground connection is present. It is mandatory because the touch current of the AC drives is more than 3.5 mA AC (refer to EN 61800-5-1).

### WARNING

Death or serious personal injury



- Install the electrical connections according to the wiring diagrams.

### WARNING

Death or serious personal injury



- The drive must always be grounded with a grounding conductor that is connected to the grounding terminal. The terminal is identified with the grounding symbol in [4.2.2 RSI input terminals](#).



To avoid arc discharge and fire, tighten all terminals with the specified torque.

For distances (pump to the inverter) exceeding 15 m (50 ft), use a sine-wave filter with matching current ratings.

### Minimum cross-sectional area of protective conductors (HD 60364-5-54)

| Cross-sectional area of the phase conductors (S) [mm <sup>2</sup> ] | The minimum cross-sectional area of the protective grounding conductor [mm <sup>2</sup> ] |
|---------------------------------------------------------------------|-------------------------------------------------------------------------------------------|
| $S \leq 16$                                                         | S                                                                                         |
| $16 < S \leq 35$                                                    | 16                                                                                        |
| $35 < S$                                                            | S/2                                                                                       |

The values of the table are valid only if the protective earthing conductor is made of the same metal as the phase conductors. Otherwise the cross-sectional area of the protective earthing conductor must be determined in a manner that produces a conductance equivalent to that which results from the application of this table.

The cross-sectional area of each protective grounding conductor that is not a part of the mains cable or the cable enclosure, must be a minimum of 2.5 mm<sup>2</sup> if

there is mechanical protection, and 4 mm<sup>2</sup> if there is not mechanical protection. If you have cord-connected equipment, make sure that the protective grounding conductor in the cord is the last conductor to be interrupted, if the strain-relief mechanism breaks.

Make sure to comply with the local regulations on the minimum size of the protective grounding conductor.

4.2.1 Output filters

Output filters are used for reducing the voltage stress on the motor windings and the motor insulation system as well as for decreasing acoustic noise from the motor driven by a frequency converter.

One type of output filter is available as an accessory for the RSI:

- sine-wave filters.

Using of output filters

The table below shows when an output filter is required and the type to use. The selection depends on the following:

- pump type
- power cable length
- the required reduction of the acoustic noise from the motor.

| Pump type                                                     | Shaft power, P2     | Sine-wave filter |
|---------------------------------------------------------------|---------------------|------------------|
| SP with motor voltage from 380 V                              | All                 | 0-300 m *        |
| Pumps with MG71 and MG80 up to 1.5 kW (2 hp)                  | Greater than 1.5 kW | 0-300 m *        |
| Reduction of noise emission, low reduction                    | All                 | -                |
| Reduction of voltage peaks and noise emission, high reduction | All                 | 0-300 m *        |

\* The lengths stated apply to the power cable.

## 4.2.2 RSI input terminals

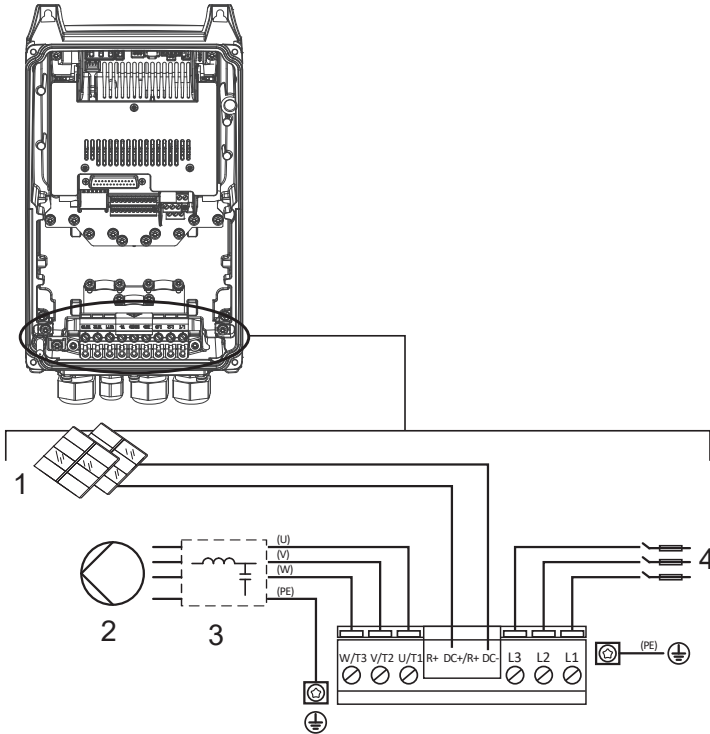


### WARNING

#### Electric shock

Death or serious personal injury

- Make sure that AC and DC power source are never supplied to the RSI simultaneously, unless it is installed with PowerAdapt. An interlocked change over switch is recommended.



Position of terminals

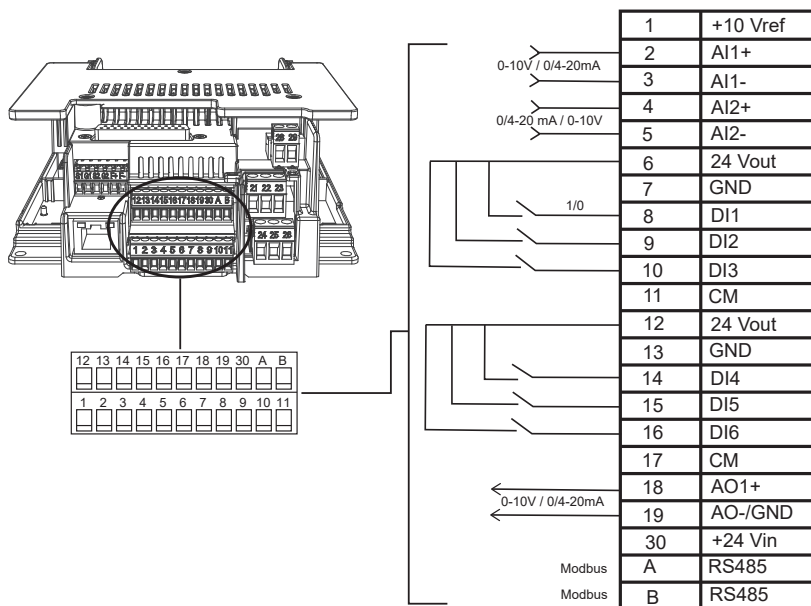
| Pos.             | Description                                                     |
|------------------|-----------------------------------------------------------------|
| 1                | Solar panel                                                     |
| 2                | Pump                                                            |
| 3                | Filter                                                          |
| 4                | AC power supply, 3 ~                                            |
| L1, L2, L3       | These terminals are the input connections for the power supply. |
| DC-, DC+/R+, R-  | DC bus terminals (DC- DC+) and brake resistor terminals (R+ R-) |
| U/T1, V/T2, W/T3 | These terminals are for motor connections.                      |

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### 4.2.3 Example of control connections

The terminals of the Standard I/Os and the Relays are described below. The terminals shown on shadowed background are assigned for signals with optional functions selectable with DIP switches. See more information in RSI Installation Manual.

#### Standrad I/O



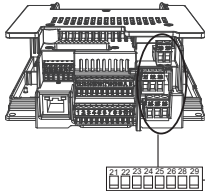
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| Pos. | Signal                             |
|------|------------------------------------|
| 1    | Reference output                   |
| 2    | Analogue input, voltage or current |
| 3    | Analogue input, common             |
| 4    | Analogue input, voltage or current |
| 5    | Analogue input, common             |
| 6    | 24 V aux. voltage                  |
| 7    | I/O ground                         |
| 8    | Digital input 1, Start/stop        |
| 9    | Digital input 2, Tank level switch |
| 10   | Digital input 3, Well level switch |
| 11   | Common for DI1-DI6 <sup>1</sup>    |
| 12   | 24 V aux. voltage                  |

| Pos. | Signal                              |
|------|-------------------------------------|
| 13   | I/O ground                          |
| 14   | Digital input 4, Flow switch        |
| 15   | Digital input 5, Flow meter         |
| 16   | Digital input 6, AC operation       |
| 17   | CM, common for DI1-DI6              |
| 18   | Analogue output, voltage or current |
| 19   | Analogue output, common             |
| 30   | 24 V auxiliary input voltage        |
| A    | Serial bus, negative                |
| B    | Serial bus, positive                |

<sup>1</sup> Can be isolated from ground, see RSI Installation Manual.

#### 4.2.3.1 Relay and thermistor input terminals

|                                                                                  | Pos.  | Signal                |
|----------------------------------------------------------------------------------|-------|-----------------------|
|  | 21    | RO1/1                 |
|                                                                                  | 22    | RO1/2                 |
|                                                                                  | 23    | RO1/3                 |
|                                                                                  | 24    | RO2/1                 |
|                                                                                  | 25    | RO2/2                 |
|                                                                                  | 26    | RO2/3                 |
|                                                                                  | 28    | TI1+                  |
|                                                                                  | 29    | TI1-                  |
|                                                                                  |       |                       |
|                                                                                  |       |                       |
|                                                                                  | RO1/1 |                       |
|                                                                                  | RO1/2 | Relay output 1, Fault |
|                                                                                  | RO1/3 |                       |
|                                                                                  | RO2/1 |                       |
|                                                                                  | RO2/2 | Relay output 2, Run   |
|                                                                                  | RO2/3 |                       |
|                                                                                  | TI1+  |                       |
|                                                                                  | TI1-  | Thermistor input      |

## 5. Operation

### DANGER

#### Electric shock

Death or serious personal injury



- Do not touch the motor cable terminals U, V, W, the brake resistor terminals, or the DC terminals when the drive is connected to mains. These terminals are live when the drive is connected to mains, also when the motor does not operate.

### WARNING

Death or serious personal injury



- Check all electrical connections before setting up the system.

### WARNING

#### Hot surface

Death or serious personal injury



- The heat sink becomes hot during running. Do not touch it.



In case of altitudes over 1000 m (3280 ft), reduce the output current by 10 % for every 1500 m (4921 ft).

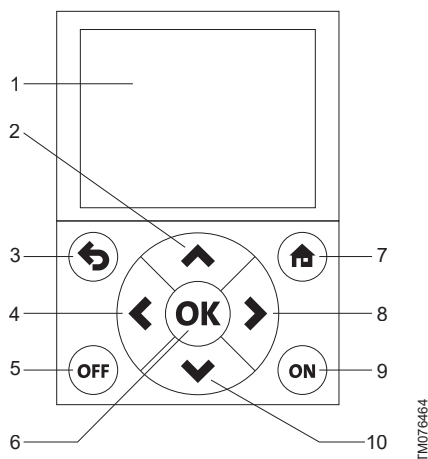


Adjust control parameters according to the steps indicated in this manual before the first start.

## 5.1 Operating panel



Changing the parameters can influence the MPPT and may cause malfunction.



TM076464

Operating panel

| Pos. | Description                                                             |
|------|-------------------------------------------------------------------------|
| 1    | Display                                                                 |
| 2    | Scroll menu up<br>Increase value                                        |
| 3    | Move backward in menu<br>Exit edit mode<br>Reset faults with long press |
| 4    | Move cursor left                                                        |
| 5    | Stop button                                                             |
| 6    | Enter active level/item<br>Confirm selection                            |
| 7    | Change control place<br>Access control page<br>Change direction         |
| 8    | Move cursor right                                                       |
| 9    | Start button                                                            |
| 10   | Scroll menu down<br>Decrease value                                      |

### 5.1.1 Advanced password

RSI is designed to fit into solar applications, and some parameters are hidden by a password (681400). Enter it in the quick setup under "Advanced password" to get full access to all the parameters.

## 5.2 Startup wizard parameter description

| Name                | Description                                | Factory setting   | User setting |
|---------------------|--------------------------------------------|-------------------|--------------|
| Language Selection  | Select language                            | English           |              |
| Startup wizard      | Select startup wizard                      | Yes               |              |
| Motor type          | Select motor technology                    | Induction motor   |              |
| Motor Nom Voltage   | Motor rated voltage                        | Variant-dependent |              |
| Motor Nom Freq      | Motor rated frequency                      | 50                |              |
| Motor Nom Speed     | Motor nominal speed                        | 2850 RPM          |              |
| Motor Nom Current   | Motor rated current                        | Size-dependent    |              |
| Motor Cos Phi       | Motor power factor                         | Size-dependent    |              |
| Motor Nom Power     | Motor rated power                          | Size-dependent    |              |
| Output Sinus Filter | Select if sine-wave filter is used or not  | Yes               |              |
| Pump Selection      | Grundfos pump family                       | SP                |              |
| Module MP Voltage   | Vmp maximum power point voltage            | 33                |              |
| Modules in series   | Number of solar panels in series           | 18                |              |
| Application         | Select application Solar or PID with solar | Solar standard    |              |

The User settings column is left blank to allow users to write down their own input settings.



After modifying the parameters in the table above, the inverter needs to be stopped and started again to update the parameters.



No record is made of undervoltage fault caused by insufficient power due to low sunlight intensity.



### Rotation direction:

1. Check the rotation direction at start up, on a sunny day.
2. Start the pump and observe the water flow.
3. Stop the pump. In the **Main menu**, go to **Quick setup**, locate **Rotation direction**, and change it to reverse.
4. Start the pump and observe the water flow.
5. Stop the pump. In the **Quick setup** menu, select the direction that provides the most water.

### Minimum frequency for discharge:

1. Set the minimum frequency for the discharge flow, on a sunny day.
2. On the keypad, press **Position 7** and select **Set min. Frequency**.
3. Start the pump and observe the water flow.
4. If no flow is observed, increase the frequency until the water is flowing.
5. Press **OK** to store the new minimum frequency.





## 6. Fault finding the product

### 6.1 Fault codes and remedies

| Fault code | Fault ID | Fault name                   | Possible cause                                                                                                                                                                                          | Remedy                                                                                                                                                                                               |
|------------|----------|------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1          | 1        | Overcurrent (hardware fault) | AC drive has detected too high current ( $> 4 \cdot I_H$ ) in the power cable:                                                                                                                          | Check the load.<br>Check the motor.                                                                                                                                                                  |
|            | 2        | Overcurrent (software fault) | <ul style="list-style-type: none"> <li>sudden heavy load increase</li> <li>short circuit in power cables</li> <li>unsuitable motor</li> </ul>                                                           | Check the cables and the connections.<br>Run an identification.<br>Check the ramp times.                                                                                                             |
| 2          | 10       | Overvoltage (hardware fault) | The DC-link voltage has exceeded the limits defined.                                                                                                                                                    | Extend the deceleration time.                                                                                                                                                                        |
|            | 11       | Overvoltage (software fault) | <ul style="list-style-type: none"> <li>deceleration time is too short</li> <li>brake chopper is disabled</li> <li>high overvoltage spikes in supply</li> <li>start/stop sequence is too fast</li> </ul> | Use a brake chopper or brake resistor (available as options).<br>Activate overvoltage controller.<br>Check input voltage.                                                                            |
| 3          | 20       | Earth fault (hardware fault) | Current measurement has detected that the motor phase current sum is not zero.                                                                                                                          | Check the power cables and the motor.                                                                                                                                                                |
|            | 21       | Earth fault (software fault) | <ul style="list-style-type: none"> <li>insulation failure in the cables or the motor</li> </ul>                                                                                                         |                                                                                                                                                                                                      |
| 5          | 40       | Charging switch              | The charging switch is open, when the START command is given. <ul style="list-style-type: none"> <li>faulty operation</li> <li>component failure</li> </ul>                                             | Reset the fault and restart.<br>Contact the nearest distributor if the fault reoccurs.                                                                                                               |
| 7          | 60       | Saturation                   | Various causes: <ul style="list-style-type: none"> <li>defective component</li> <li>brake resistor short circuit or overload</li> </ul>                                                                 | It cannot be reset from keypad.<br>Switch off power.<br>Do not switch the power back on!<br>Contact Grundfos.<br>If this fault appears simultaneously with F1, check the power cables and the motor. |

| Fault code | Fault ID | Fault name           | Possible cause                                                                                                                                                                                                                                                                      | Remedy                                                                                                                                                                                               |
|------------|----------|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 8          | 600      | System fault         | Communication between control circuit and power unit has failed.                                                                                                                                                                                                                    | Reset the fault and restart.<br>Contact the nearest distributor if the fault reoccurs.                                                                                                               |
|            | 601      |                      | Communication interference between control circuit and power unit, but it is still working.                                                                                                                                                                                         |                                                                                                                                                                                                      |
|            | 602      |                      | Watchdog has reset the CPU.                                                                                                                                                                                                                                                         |                                                                                                                                                                                                      |
|            | 603      |                      | Auxiliary power voltage in power unit is too low.                                                                                                                                                                                                                                   |                                                                                                                                                                                                      |
|            | 604      |                      | Phase fault: Voltage of an output phase does not follow the reference.                                                                                                                                                                                                              |                                                                                                                                                                                                      |
|            | 605      |                      | CPLD has faulted, but there is no detailed information about the fault.                                                                                                                                                                                                             | Update software. Contact the nearest distributor if the fault reoccurs.                                                                                                                              |
|            | 606      |                      | Control panel and power unit software are incompatible.                                                                                                                                                                                                                             |                                                                                                                                                                                                      |
|            | 607      |                      | Software version cannot be read. There is no software in the power unit.                                                                                                                                                                                                            |                                                                                                                                                                                                      |
|            | 608      |                      | CPU overload. A part of the software (for example application) causes an overload situation. The source of the fault is suspended.                                                                                                                                                  |                                                                                                                                                                                                      |
|            | 609      |                      | Memory access has failed. For example, retain variables could not be restored.                                                                                                                                                                                                      |                                                                                                                                                                                                      |
|            | 610      |                      | Necessary device properties cannot be read.                                                                                                                                                                                                                                         | Update software. Contact the nearest distributor if the fault reoccurs.                                                                                                                              |
|            | 614      |                      | Configuration error.                                                                                                                                                                                                                                                                |                                                                                                                                                                                                      |
|            | 647      |                      | Software error.                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                      |
|            | 648      |                      | Invalid function block is used in the application. System software and application are not compatible.                                                                                                                                                                              |                                                                                                                                                                                                      |
|            | 649      |                      | Resource overload.<br>Error when loading parameter initial values.<br>Error when restoring parameters.<br>Error when saving parameters.                                                                                                                                             |                                                                                                                                                                                                      |
| 9          | 80       | Undervoltage (fault) | DC-link voltage is under the limits defined.                                                                                                                                                                                                                                        | In case of temporary supply voltage failure, reset the fault and restart the AC drive. Check the supply voltage. If it is adequate, an internal fault has occurred. Contact the nearest distributor. |
|            | 81       | Undervoltage (alarm) | <ul style="list-style-type: none"> <li>the most probable cause: supply voltage is too low</li> <li>AC drive internal fault</li> <li>defective input fuse</li> <li>external charge switch is not closed</li> </ul> <p>Note! This fault occurs only if the drive is in Run state.</p> |                                                                                                                                                                                                      |

| Fault code | Fault ID | Fault name                                  | Possible cause                                                                                                                                                                                      | Remedy                                                                                                                |
|------------|----------|---------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|
| 10         | 91       | Input phase                                 | Input line phase is missing.                                                                                                                                                                        | Check the supply voltage, the fuses and the cables.                                                                   |
| 11         | 100      | Output phase supervision                    | Current measurement has detected that there is no current in one of the motor phases.                                                                                                               | Check the power cable and the motor.                                                                                  |
| 12         | 110      | Brake chopper supervision (hardware fault)  | No brake resistor installed.<br>Brake resistor is broken.                                                                                                                                           | Check the brake resistor and the cabling.<br>If these are OK, the chopper is faulty. Contact the nearest distributor. |
|            | 111      | Brake chopper saturation alarm              | Brake chopper failure.                                                                                                                                                                              |                                                                                                                       |
| 13         | 120      | AC drive undertemperature (fault)           | The temperature is too low in the heat sink or board of the power unit.<br>Heat sink temperature is under -10 °C (14 °F).                                                                           | Check the ambient temperature.                                                                                        |
| 14         | 130      | AC drive overtemperature (fault, heat sink) | The temperature is too high in the heat sink or board of the power unit.<br>Heat sink temperature is over 100 °C (212 °F).                                                                          | Check the correct amount and flow of cooling air.                                                                     |
|            | 131      | AC drive overtemperature (alarm, heat sink) |                                                                                                                                                                                                     | Check the heat sink for dust.                                                                                         |
|            | 132      | AC drive overtemperature (fault, board)     |                                                                                                                                                                                                     | Check the ambient temperature.                                                                                        |
|            | 133      | AC drive overtemperature (alarm, board)     |                                                                                                                                                                                                     | Make sure that the switching frequency is not too high in relation to the ambient temperature and motor load.         |
| 15         | 140      | Motor stops                                 | Motor stops.                                                                                                                                                                                        | Check the motor and the load.                                                                                         |
| 16         | 150      | Motor overtemperature                       | Motor is overloaded.                                                                                                                                                                                | Decrease the motor load.<br>If the motor is not overloaded, check the temperature model parameters.                   |
| 17         | 160      | Motor underload                             | Motor is underloaded.                                                                                                                                                                               | Check the load.                                                                                                       |
| 19         | 180      | Power overload (short-time supervision)     | Drive power is too high.                                                                                                                                                                            | Decrease the load.                                                                                                    |
|            | 181      | Power overload (long-time supervision)      |                                                                                                                                                                                                     |                                                                                                                       |
| 25         | 240      | Motor control fault                         | Start angle identification has failed.                                                                                                                                                              | Reset the fault and restart.                                                                                          |
|            | 241      |                                             | Generic motor control fault.                                                                                                                                                                        | Contact the nearest distributor if the fault reoccurs.                                                                |
| 26         | 250      | Startup prevented                           | The drive fails to start. Run request is ON when a new software (firmware or application), a parameter setting or any other file, which affects the operation of the drive, is loaded to the drive. | Reset the fault and stop the AC drive.<br>Load the software and start the AC drive.                                   |

| Fault code | Fault ID     | Fault name                      | Possible cause                                                                                                                                                            | Remedy                                                                                                                                 |
|------------|--------------|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|
| 30         | 530          | STO fault                       | Emergency stop button or some other STO operation is activated.                                                                                                           | When the STO function is activated, the drive is in safe state.                                                                        |
| 32         | 312          | Fan cooling                     | The fan lifetime is up.                                                                                                                                                   | Change the fan and reset fan lifetime counter.                                                                                         |
| 33         | 320          | Fire mode enabled               | The fire mode of the drive is enabled. The drive protections are not in use.                                                                                              | Check the parameter settings                                                                                                           |
| 37         | 360          | Device changed (same type)      | The option board changed for one previously inserted in the same slot. The board's parameter settings are saved.                                                          | The device is ready for use. Old parameter settings are used.                                                                          |
| 38         | 370          | Device changed (same type)      | The option board added. The option board was previously inserted in the same slot. The board's parameter settings are saved.                                              | The device is ready for use. Old parameter settings are used.                                                                          |
| 39         | 380          | Device removed                  | The option board is removed from the slot.                                                                                                                                | The device is no longer available.                                                                                                     |
| 40         | 390          | Device unknown                  | Unknown device is connected (power unit/option board).                                                                                                                    | The device is no longer available.                                                                                                     |
| 41         | 400          | IGBT temperature                | IGBT temperature (unit temperature + I <sub>2</sub> T) is too high.                                                                                                       | Check the load.<br>Check the motor size.<br>Run an identification.                                                                     |
| 44         | 430          | Device changed (different type) | The option board or the power unit has changed. The parameter settings are not saved.                                                                                     | Set the option board parameters again if the option board is changed. Set the converter parameters again if the power unit is changed. |
| 45         | 440          | Device changed (different type) | The option board is added. The option board was previously not present in the same slot. Parameter settings are not saved.                                                | Set the option board parameters again.                                                                                                 |
| 46         | 662          | Real Time Clock                 | RTC battery voltage level is low.                                                                                                                                         | Replace the battery.                                                                                                                   |
| 47         | 663          | Software updated                | Software of the drive is updated (either the whole software package or the application).                                                                                  | No action is required.                                                                                                                 |
| 50         | 1050         | AI low fault                    | At least one of the available analogue input signals is below 50 % of the defined minimum signal range.<br>Control cable is broken or loose.<br>Signal source has failed. | Change the faulty parts.<br>Check the analogue input circuit.<br>Check that parameter AI1 signal range is set correctly.               |
| 51         | 1051         | External fault                  | The fault is activated by a digital input.                                                                                                                                | Check the digital input or the device connected to it.<br>Check the parameter settings.                                                |
| 52         | 1052<br>1352 | Keypad communication fault      | The connection between the control keypad and the frequency converter is broken.                                                                                          | Check the keypad connection and possibly the keypad cable.                                                                             |
| 53         | 1053         | Fieldbus communication fault    | The data connection between the fieldbus master and the fieldbus board is broken.                                                                                         | Check the installation and the fieldbus master.                                                                                        |

| Fault code | Fault ID | Fault name                  | Possible cause                                                                                                                                                           | Remedy                                                                                                                                                                                                              |
|------------|----------|-----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 54         | 1654     | Slot D fault                | Defective option board or slot.                                                                                                                                          | Check the board and the slot.                                                                                                                                                                                       |
|            | 1754     | Slot E fault                |                                                                                                                                                                          |                                                                                                                                                                                                                     |
| 57         | 1057     | Identification              | Identification run has failed.                                                                                                                                           | <p>Check that the motor is connected to the drive.</p> <p>Ensure that there is no load on the motor shaft.</p> <p>Ensure that the start command is not removed before the completion of the identification run.</p> |
| 58         | 1058     | Mechanical brake            | The actual status of the mechanical brake differs from the control signal for longer than what is defined.                                                               | Check the status and connections of the mechanical brake.                                                                                                                                                           |
| 60         | 1060     | Low DC power                | <p>The drive stops because there is no sufficient power from the solar panels.</p> <p>The drive cannot start because the DC voltage is below the threshold in P1.18.</p> | Wait for more solar irradiation or add more solar panel strings.                                                                                                                                                    |
| 61         | 1061     | Restart delay               | The drive is waiting for the programmed time before starting again.                                                                                                      | Wait until the programmed time is elapsed.                                                                                                                                                                          |
| 62         | 1062     | Low well level              | The water level in the well is below the minimum level.                                                                                                                  | Dry run is detected. Check the settings and the status of the water level.                                                                                                                                          |
| 63         | 1063     | Low water level             | The minimum water level is insufficient.                                                                                                                                 | Check the settings and the status of the water level.                                                                                                                                                               |
| 64         | 1064     | High tank level             | The water level in the tank is above the maximum level.                                                                                                                  | Check the settings and the status of the water level.                                                                                                                                                               |
| 65         | 1065     | PC communication fault      | The data connection between the PC and the frequency converter is broken.                                                                                                |                                                                                                                                                                                                                     |
| 66         | 1066     | Thermistor fault            | The thermistor input has detected an increase of the motor temperature.                                                                                                  | <p>Check the motor cooling and load.</p> <p>Check the thermistor connection. (If the thermistor input is not in use, it must be short circuited)</p>                                                                |
| 68         | 1301     | Maintenance counter 1 alarm | Maintenance counter has reached the alarm limit.                                                                                                                         | Carry out the required maintenance and reset the counter.                                                                                                                                                           |
|            | 1302     | Maintenance counter 2 alarm | Maintenance counter has reached the alarm limit.                                                                                                                         | Carry out the required maintenance and reset the counter.                                                                                                                                                           |
|            | 1303     | Maintenance counter 3 alarm | Maintenance counter has reached the alarm limit.                                                                                                                         | Carry out the required maintenance and reset the counter.                                                                                                                                                           |
|            | 1304     | Maintenance counter 4 alarm | Maintenance counter has reached the alarm limit.                                                                                                                         | Carry out the required maintenance and reset the counter.                                                                                                                                                           |

| Fault code | Fault ID | Fault name                       | Possible cause                                                                                                            | Remedy                                                                                                       |
|------------|----------|----------------------------------|---------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|
| 69         | 1310     | Fieldbus mapping error           | Non-existing ID number is used for mapping values to Fieldbus Process Data Out.                                           | Check the parameters in Fieldbus Data Mapping menu.                                                          |
|            | 1311     |                                  | Converting one or more values for Fieldbus Process Data Out is not possible.                                              | The value being mapped may be an undefined type. Check parameters in Fieldbus Data Mapping menu.             |
|            | 1312     |                                  | Overflow when mapping and converting values for Fieldbus Process Data Out (16-bit).                                       |                                                                                                              |
| 71         | 1071     | Unsupported                      | The application is not compatible with the drive.                                                                         | Update the software. Contact the nearest distributor if the fault re-occurs.                                 |
| 76         | 1076     | Start failed                     | The Start command is active and is blocked to prevent unintentional rotation of the motor during the first start-up.      | Reset the drive to restore normal operation. The necessity of the restart depends on the parameter settings. |
| 77         | 1077     | > 5 connections                  | The maximum number of 5 simultaneous active fieldbus or PC tool connections supported by the application exceeded.        | Remove excessive active connections.                                                                         |
| 79         | 1079     | Flow switch fault                | The switch does not indicate flow.                                                                                        |                                                                                                              |
| 80         | 1080     | Minimum flow measurement fault   | The measurement from the flow meter is below the minimum.                                                                 |                                                                                                              |
| 100        | 1100     | Soft fill time-out               | The Soft fill function in the PID controller has timed out. The wanted process value is not achieved within the time set. | Check for any pipe bursts.                                                                                   |
| 101        | 1101     | Process supervision fault (PID1) | PID controller: The feedback value is outside of the supervision limits (and the delay if set).                           | Check the settings.                                                                                          |
| 105        | 1105     | Process supervision fault (PID2) | PID controller: The feedback value is outside of the supervision limits (and the delay if set).                           | Check the settings.                                                                                          |
| 109        | 1109     | Input pressure supervision       | Input pressure supervision signal is below the alarm limit.                                                               | Check the process.<br>Check the parameters.                                                                  |
|            | 1409     |                                  | Input pressure supervision signal is below the fault limit.                                                               | Check the input pressure sensor and the connections.                                                         |

| Fault code | Fault ID | Fault name          | Possible cause                                                                      | Remedy                                                                       |
|------------|----------|---------------------|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------|
| 111        | 1315     | Temperature fault 1 | At least one of the selected temperature input signals has reached the alarm limit. | Find the cause of the temperature raise.                                     |
|            | 1316     |                     | At least one of the selected temperature input signals has reached the fault limit. |                                                                              |
| 112        | 1317     | Temperature fault 2 | At least one of the selected temperature input signals has reached the fault limit. | Check that the temperature input is hard-wired if a sensor is not connected. |
|            | 1318     |                     | At least one of the selected temperature input signals has reached the fault limit. | For further information, see the option board manual.                        |

## 6.2 Resetting fault codes

When a fault occurs and the RSI stops, examine the cause of the fault, perform the actions described in [6.1 Fault codes and remedies](#) and reset the fault in one of the ways below:

1. Press and hold the Reset button on the keypad (1 s).
2. Enter the Diagnostics menu (M4), enter the Reset faults (M4.2) and select the Reset faults parameter.
3. For keypads with LCD display only: Select the value Yes for the parameter and click OK.

## 6.3 Fault history

The inverter records the 40 most recent fault codes. Fault information is stored with additional information in the Fault history menu.



Check the cause of the fault thoroughly and remedy the fault before resetting. If it cannot be reset or persists after resetting, check the cause again as continuous re-setting may damage the inverter.



In case of overload and overheat protection, delay the resetting for 5 minutes.

## 6.4 Reset to factory default

1. In the **Main menu**, go to **User settings**.
2. Locate **Parameter backup** and select **Restore factory default** and activate it.



Stop the RSI before the reset.



Go through the startup wizard after the re-start is done.

## 7. Servicing the product

### DANGER

#### Electric shock

Death or serious personal injury



- Before servicing the product, make sure that the power supply is switched off and it cannot be switched on unintentionally.

### WARNING

Death or serious personal injury

- Maintenance and inspection must be performed by a qualified electrician.



### WARNING

Death or serious personal injury

- To do work on the terminal connections of the drive, disconnect the drive from mains and make sure that the motor is stopped. Wait 5 minutes before opening the cover of the drive. Use a measuring device to make sure that there is no voltage. The terminal connections and the components of the drive are still live for 5 minutes after they have been disconnected from the motor.



Any service performed on the inverter by unqualified staff will void the warranty.

## 7.1 Routine inspection

To ensure the inverter runs stable, carry out an annual inspection.

### 7.1.1 Inspection and maintenance requirements

### WARNING

Death or serious personal injury



- Before inspecting the product, make sure that the power supply is switched off and it cannot be switched on intentionally.

1. If it is necessary to conduct an insulation test on the inverter, all input and output terminals must have a proper short circuit. Insulation tests must not be performed on a single terminal. Use a 500 V megohmmeter to conduct the test.



Do not use the megohmmeter to test the control circuit.

2. When conducting an insulation test on the motor, between motor and inverter.



### 7.1.2 Main inspection and maintenance points

| Inspection frequency  |                       | Inspection issue            | Inspection item                                                             | Criteria or requirements                                                                                                                         |
|-----------------------|-----------------------|-----------------------------|-----------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| Routine <sup>1)</sup> | Regular <sup>2)</sup> |                             |                                                                             |                                                                                                                                                  |
| √                     |                       | Running environment         | 1. Temperature<br>2. Humidity<br>3. Gas<br>4. Dust                          | 1. Temperature < 50 °C (122 °F).<br>2. Humidity < 90 %, no condensation.<br>3. No flammable, explosive gas.<br>4. Non-corrosive environment.     |
|                       | √                     | Cooling system              | 1. Installation environment<br>2. Radiator<br>3. Fan                        | 1. Good ventilation in installation environment.<br>2. Radiator air duct not blocked.<br>3. Fan should be running smoothly, if equipped.         |
| √                     |                       | Inverter cabinet            | 1. Vibration<br>2. Temperature rise<br>3. Noise<br>4. Conductors, terminals | 1. Vibration that appears steady and normal<br>2. Normal temperature.<br>3. No abnormal noise.<br>4. Conductors and terminals fastened properly. |
| √                     |                       | Motor                       | 1. Vibration<br>2. Temperature rise<br>3. Noise                             | 1. Steady running.<br>2. Normal temperature.<br>3. No abnormal noise.                                                                            |
| √                     |                       | Input and output parameters | 1. Input voltage<br>2. Output current                                       | 1. Input voltage within limit.<br>2. Output current under the rated value.                                                                       |

<sup>1)</sup> Every 1000 running hours.

<sup>2)</sup> Every month.

## 7.2 Inspection and replacement of wear parts

### 7.2.1 Cooling fan

Inverters are equipped with cooling fans. The service life of the cooling fan is about 15000 hours. If the fan generates abnormal noise or produces vibrations, replace it immediately. The cooling fan starts automatically when the internal temperature of the inverter exceeds 55 °C (131 °F) and stops when the internal temperature of the inverter falls below 45 °C (113 °F).

## 7.3 Storage and warranty

### 7.3.1 Storage

If the product is stored for a long time after purchasing, make sure to comply with the following requirements:

1. Avoid placing the inverter in high-temperature or humid areas or areas with vibration and metal dust. Ensure proper ventilation.
2. The performance of the capacitor inside the inverter can be reduced if the equipment is not used for a long period of time. It is necessary to start up the equipment every two years to restore the performance of the capacitor and inspect the inverter function at the same time. The voltage must be increased gradually through a DC power supply with power-on time being no less than 5 hours.

### 7.3.2 Warranty

The warranty is not valid in the following cases:

- Faults caused by failure to comply with this manual or standard specifications.
- Faults caused by unauthorised repairs and modifications.
- Faults caused by inadequate storage and maintenance.
- Faults caused by inappropriate use.
- Damage caused by fire, salt corrosion, gas corrosion, earthquake, storm, flooding, lightning, abnormal voltage or other force majeure situations.

## 8. Disposing of the product

This product or parts of it must be disposed of in an environmentally sound way.

1. Use the public or private waste collection service.
2. If this is not possible, contact the nearest Grundfos company or service workshop.

See also end-of-life information at [www.grundfos.com/product-recycling](http://www.grundfos.com/product-recycling).

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