

## Installation and operating instructions



**GRUNDFOS** 



# IO 242

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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. Product introduction

### 2.1 Product description

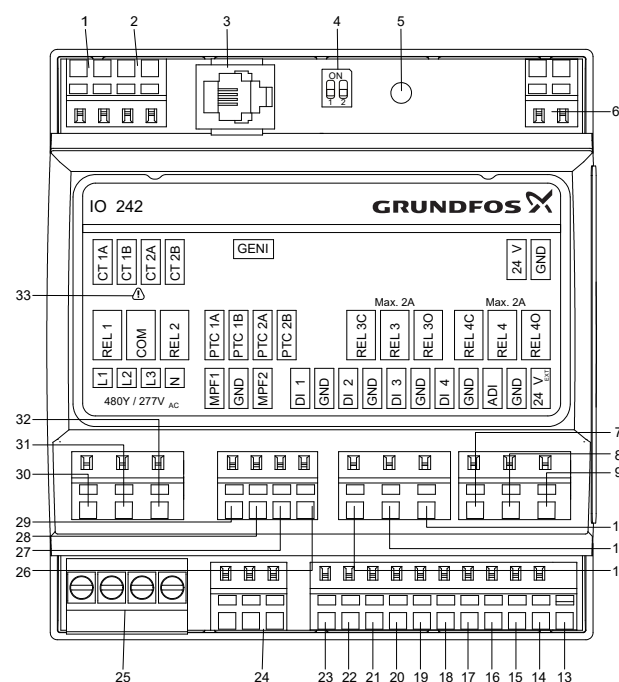
The IO 242 pump module is used together with other Grundfos controllers and modules. With a Grundfos CU 24X control unit, the control unit will control one or two pumps, monitor the running conditions of the pumps and have all the connections to sensors in the pit or tank and pump motors. The pump module provides analog and digital input signals for Grundfos CU 24X. It also provides digital outputs used for external switch gear.

### 2.2 Intended use, IO 242

The control unit is designed to control one or two pumps. The product can be configured for two purposes: emptying a wastewater pit or filling a pit or tank. The product can be used for network pumping stations, main pumping stations, commercial buildings and municipal systems.

The product must not be exposed to aggressive solvents or oil-containing liquids.

### 2.3 Terminals



Remember to separate potentially low-voltage cables from potentially high-voltage cables when connecting them to the control unit.

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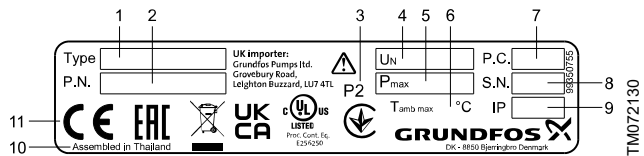
| Pos. | Description                                                                       |
|------|-----------------------------------------------------------------------------------|
| 1    | Current transformer, pump 1. Optional.                                            |
| 2    | Current transformer, pump 2. Optional.                                            |
| 3    | GENIbus                                                                           |
| 4    | Switch for termination resistor, SW1                                              |
| 5    | Not in use                                                                        |
| 6    | Supply voltage, 24 VDC                                                            |
| 7    | User-configurable output relay 4, normally closed                                 |
| 8    | User-configurable output relay 4, common                                          |
| 9    | User-configurable output relay 4, normally open                                   |
| 10   | User-configurable output relay 3, normally open                                   |
| 11   | User-configurable output relay 3, common                                          |
| 12   | User-configurable output relay 3, normally closed                                 |
| 13   | Supply voltage for sensors, 24 VDC, max. 50 mA                                    |
| 14   | Ground, GND                                                                       |
| 15   | User-configurable analog or digital input                                         |
| 16   | Ground, GND                                                                       |
| 17   | Digital input 4                                                                   |
| 18   | Ground, GND                                                                       |
| 19   | Digital input 3                                                                   |
| 20   | Ground, GND                                                                       |
| 21   | Digital input 2                                                                   |
| 22   | Ground, GND                                                                       |
| 23   | Digital input 1                                                                   |
| 24   | Motor-protection feedback                                                         |
| 25   | Phase monitoring                                                                  |
| 26   | Temperature and moisture sensor input, pump 1                                     |
| 27   | Temperature and moisture sensor input, pump 1                                     |
| 28   | Temperature and moisture sensor input, pump 2                                     |
| 29   | Temperature and moisture sensor input, pump 2                                     |
| 30   | Relay output, pump 1                                                              |
| 31   | Common                                                                            |
| 32   | Relay output, pump 2                                                              |
| 33   | Caution! Only dedicated current transformers can be connected to these terminals. |

Related information

[5.1 Connecting the power supply](#)

2.4 Identification

2.4.1 Nameplate



| Pos. | Description                       |
|------|-----------------------------------|
| 1    | Product name                      |
| 2    | Version number and product number |
| 3    | Factory code                      |
| 4    | Supply voltage                    |
| 5    | Max. power consumption            |
| 6    | Maximum ambient temperature       |
| 7    | Production code (year and week)   |

| Pos. | Description                      |
|------|----------------------------------|
| 8    | Serial number                    |
| 9    | Enclosure class according to IEC |
| 10   | Production site                  |
| 11   | Markings and approvals           |

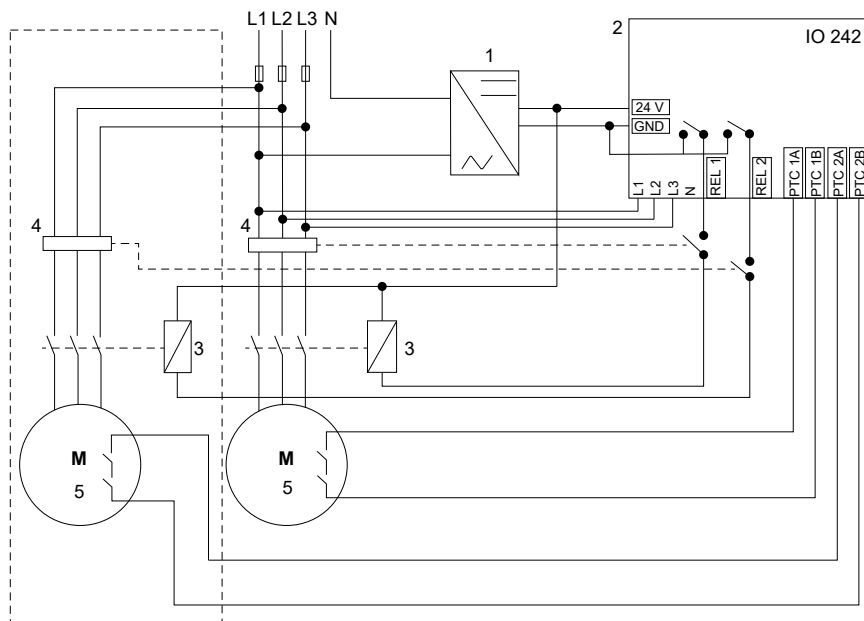
2.5 GENIbus

GENIbus, the Grundfos Electronics Network Intercommunications bus, is a fieldbus developed by Grundfos to meet the need for data transfer in all typical Grundfos motor or pump applications. Grundfos devices with GENIbus can be wired together in networks and integrated in automation systems. Each device on the network must have a unique GENIbus address. GENIbus is based on the RS485 hardware standard and typically operates at a baud rate of 9600 bits/s.

## 2.6 PTC

The control unit offers a thermal protection, PTC, for the connected motors.

IO 242 is a subassembly ensuring safe stop of the motors. The PTC function fulfills performance level C, category 1, according to ISO 13849. The drawing shows the recommended PTC wiring for IO 242.



| Pos. | Description      |
|------|------------------|
| 1    | Power supply     |
| 2    | IO 242           |
| 3    | Motor relay      |
| 4    | Motor protection |
| 5    | PTC              |
| M    | Motor            |

### Related information

[5.1 Connecting the power supply](#)

[7.1 Electrical data](#)

## 3. Installation requirements

### 3.1 Location

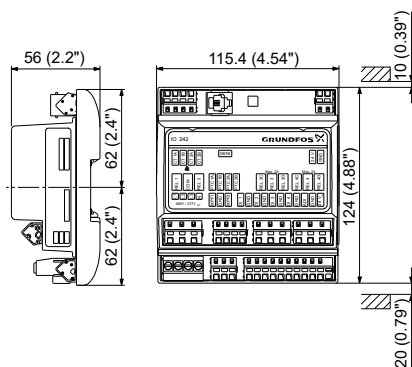
The product is intended for installation in a control panel.

## 4. Mechanical installation

### 4.1 Mounting the module

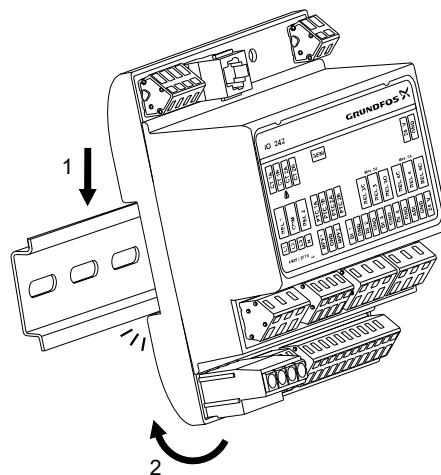
The product is prepared for horizontal mounting on a 35 mm DIN rail (EN 50022). Recommended height: 7.5 mm.

Module dimensions and required minimum clearance above and below the module are shown on the drawing.



Dimensions for IO 242

1. Fit the module by hooking the top on the DIN rail (1) and pressing the bottom against the rail (2).



2. Connect the cables.

### 4.2 EMC-correct installation

The panel usually contains a control unit, a module, contactors and other power equipment. Other Grundfos modules may also be fitted into the panel.

To ensure faultless operation, it is very important to install the electronic modules in an EMC-correct way.

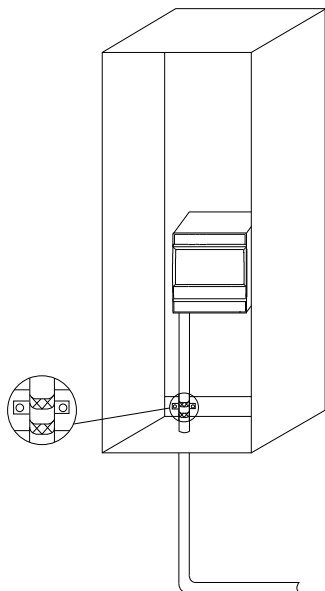
#### 4.2.1 How to install the product in an EMC-correct way

- Use shielded cables for external GENIbus. Connect the shield to the cable clamp.

TM075363

TM072261

TM072260



TM075468

- Connect the shield to the earth terminal inside the control cabinet.
- Do not twist shield ends, as this will destroy the shield effect at high frequencies.
- Ensure that the DIN rail has a good connection to functional earth.  
The module has been designed to ensure a good electrical contact to the DIN rail.

## 5. Electrical connection

### 5.1 Connecting the power supply

#### WARNING Electric shock

Death or serious personal injury



- Switch off the power supply before making any electrical connections.
- Make sure that the power supply cannot be switched on accidentally.



Do not connect the phase inputs to the module if the input is higher than 3 x 480 VAC.

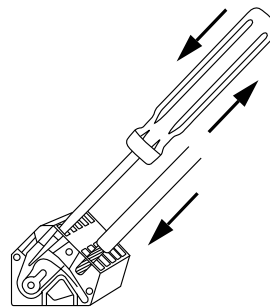


Install the product by following the wiring practice rules of IEC 60204-1 to avoid short circuit of the PTC sensor wiring. This secures the protective function of the PTC sensor.



Changes or modifications not expressly approved by Grundfos may void the user's authority to operate the equipment.

1. Check that the supply voltage corresponds with the needed 24 VDC, and ensure that the polarity is connected correctly according to the label on the product itself.
2. Connect the power cables and pump cables according to the relevant electrical diagram.
3. Tighten the terminal screws to 0.5 Nm.  
Remember to remove the jumper from the PTC terminal if you are connecting cables from the temperature sensor to the PTC terminals.



TM070570

Connecting a wire to a terminal with spring clamps

#### Related information

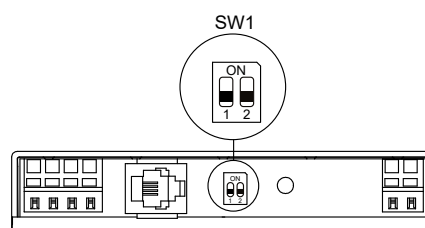
[2.3 Terminals](#)

[2.6 PTC](#)

### 5.2 Setting the termination resistor

The GENIbus termination resistor DIP switch SW1 has two bits switches, SW1-1 and SW1-2.

SW1-2 is used for cutting the terminal impedance in and out.



TM075594

1. Set the switches according to the table.

| Status  | SW1-1 | SW1-2 |
|---------|-------|-------|
| Cut-in  | -     | ON    |
| Cut-out | -     | OFF   |

#### Maximum cable length

| bit/s     | Terminated cable<br>m [ft] | Unterminated cable<br>m [ft] |
|-----------|----------------------------|------------------------------|
| 1200-9600 | 1200 [4000]                | 1200 [4000]                  |
| 19200     | 1200 [4000]                | 500 [1700]                   |
| 38400     | 1200 [4000]                | 250 [800]                    |

## 6. Servicing the product

The product cannot be serviced.

- Contact Grundfos. If the product is faulty, it must be replaced.

### 6.1 Inspecting the product functions



You must perform an inspection every fifth year to ensure full functionality of the product.

Recommended inspection procedure:

1. Ensure that the motor is allowed to start, i.e. the motor is cold and there is enough water in the pit.
2. With the PTC sensors connected, start the motor and observe that it runs.
3. Disconnect power from the panel.
4. Disconnect the PTC sensors from IO 242.
5. Reconnect power to the panel.
6. Attempt to start the motor and observe that it does not start, and ensure that an alarm for high motor temperature is present.
7. Disconnect power from the panel, and reconnect the PTC sensors to IO 242.

8. Perform a visual inspection to ensure that the PTC wiring is correct.
9. Reconnect power to the panel.

## 6.2 Replacing the IO module

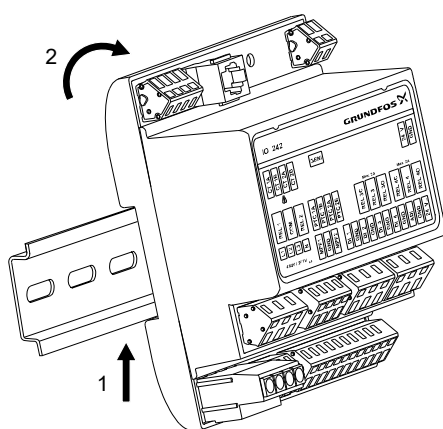
### WARNING Electric shock



Death or serious personal injury

- Switch off the power supply before making any electrical connections.
- Make sure that the power supply cannot be switched on accidentally.

1. Switch off the power supply to the product and other components with external supply.
2. Write down the terminal connection of each wire to ensure correct reconnection.
3. Disconnect all wires.
4. Press the module up gently (1).
5. Lift the module off the rail (2).



TM072262

### Removing IO 242

6. Fit the new module.
7. Connect all wires.

## 7. Technical data

### 7.1 Electrical data

#### Supply voltage

24 VDC  $\pm 10\%$ .

Power supply is required to be class 2.

Overtoltage category II.

Check that the supply voltage corresponds to the values stated on the nameplate.

The wires must be rated at minimum 70 °C (158 °F), minimum 18 AWG.



Mount only copper wires in the terminals.

#### Phase monitoring

Measurement category III.

#### Power

See nameplate.

#### Maximum current transformer input

Maximum input current in the primary side of the current transformer: 72 A.

Turns ratio: 2000:1.

Maximum output current in the secondary side of the current transformer: 50 mA.

Measurement tolerance:  $\leq 5\%$ .

The connection between the primary and secondary current transformer must be double insulated.

### Maximum power dissipation

| Object   | Maximum power dissipation |
|----------|---------------------------|
| 99369842 | 3.8 W                     |

### Input/output connections

Signal excitation (excl. EMC) must be limited to -0.5 to +26 VDC or an effective clamp current less than  $\pm 15$  mADC.

### Relay output, REL 1, REL 2

#### Maximum load

US: Pilot duty D300.

IEC:

115 VAC: Pick-up = 432 VA. Hold-in = 72 VA.

250 VAC: Pick-up = 432 VA. Hold-in = 72 VA.

24 VDC: Pick-up = 56 VA. Hold-in = 12 VA. DC-contactors must be equipped with a transient-voltage-suppression diode of maximum 53 V.

Overtoltage category 3.

The relay contacts need to be protected against currents above 8 A either by use of fuses or class 2 power supply.

### Relay output, REL 3, REL 4

250 VAC nominal and 24 VDC nominal mix use.

Nominal current: 10 mA - 2 A AC/DC.

### GENIbus terminal

-7 to +12 VDC.

Nominal current condition: 4 mADC.

Short-circuit current condition: 328 mA.

Terminal impedance: 120  $\Omega$ .

### PTC terminals

Trip resistance: greater than 2.2 k $\Omega \pm 5\%$ .

Automatic reset resistance: less than 1 k $\Omega \pm 5\%$ .

Response time: 1 second.

### DI terminal

|                    |                                     |
|--------------------|-------------------------------------|
| Digital input mode | Low logic level below 1.8 V.        |
|                    | High logic level higher than 2.7 V. |

### ADI terminal

All analogue signals have an out-of-range alarm.

|                    |                                                        |
|--------------------|--------------------------------------------------------|
| Voltage            | 0 - 10 V.                                              |
|                    | 0 - 5 V.                                               |
|                    | 0 - 3.5 V.                                             |
| Current            | 0 - 20 mA.                                             |
|                    | 4 - 20 mA.                                             |
| Temperature        | Pt100 2-wire.                                          |
|                    | Pt1000 2-wire.                                         |
|                    | Measurement range:<br>-30 to +180 °C (-22 to +356 °F). |
| Digital input mode | Low logic level below 1.8 V.                           |
|                    | High logic level higher than 2.7 V.                    |

### Related information

[2.6 PTC](#)

### 7.2 Mechanical data

#### Altitude

Maximum 2000 m (6562 ft).

## 7.3 Temperature

### Ambient temperature

|                          |                  |
|--------------------------|------------------|
| Min. ambient temperature | -30 °C (-22 °F)  |
| Max. ambient temperature | +70 °C (+158 °F) |

### Storage temperature

|                          |                  |
|--------------------------|------------------|
| Min. storage temperature | -40 °C (-40 °F)  |
| Max. storage temperature | +70 °C (+158 °F) |

## 7.4 Environmental data

### Pollution degree

Pollution degree 2.

### Humidity

5-95 %.

### Enclosure class

IP20.

## 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.



The crossed-out wheeled bin symbol on a product means that it must be disposed of separately from household waste. When a product marked with this symbol reaches its end of life, take it to a collection point designated by the local waste disposal authorities. The separate collection and recycling of such products will help protect the environment and human health.

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

## 9. Document quality feedback

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**Argentina**

Bombas GRUNDFOS de Argentina S.A.  
Ruta Panamericana km. 37.500 Indust  
1619 - Garin Pcia. de B.A.  
Tel.: +54-3327 414 444  
Fax: +54-3327 45 3190

**Australia**

GRUNDFOS Pumps Pty. Ltd.  
P.O. Box 2040  
Regency Park  
South Australia 5942  
Tel.: +61-8-8461-4611  
Fax: +61-8-8340-0155

**Austria**

GRUNDFOS Pumpen Vertrieb Ges.m.b.H.  
Grundfosstraße 2  
A-5082 Grödig/Salzburg  
Tel.: +43-6246-883-0  
Fax: +43-6246-883-30

**Belgium**

N.V. GRUNDFOS Bellux S.A.  
Boomsesteenweg 81-83  
B-2630 Aartselaar  
Tel.: +32-3-870 7300  
Fax: +32-3-870 7301

**Bosnia and Herzegovina**

GRUNDFOS Sarajevo  
Zmaja od Bosne 7-7A  
BiH-71000 Sarajevo  
Tel.: +387 33 592 480  
Fax: +387 33 590 465  
www.ba.grundfos.com  
E-mail: grundfos@bih.net.ba

**Brazil**

BOMBAS GRUNDFOS DO BRASIL  
Av. Humberto de Alencar Castelo Branco,  
630  
CEP 09850 - 300  
São Bernardo do Campo - SP  
Tel.: +55-11 4393 5533  
Fax: +55-11 4343 5015

**Bulgaria**

Grundfos Bulgaria EOOD  
Slatina District  
Iztocna Tangenta street no. 100  
BG - 1592 Sofia  
Tel.: +359 2 49 22 200  
Fax: +359 2 49 22 201  
E-mail: bulgaria@grundfos.bg

**Canada**

GRUNDFOS Canada inc.  
2941 Brighton Road  
Oakville, Ontario  
L6H 6C9  
Tel.: +1-905 829 9533  
Fax: +1-905 829 9512

**China**

GRUNDFOS Pumps (Shanghai) Co. Ltd.  
10F The Hub, No. 33 Suhong Road  
Minhang District  
Shanghai 201106 PRC  
Tel.: +86 21 612 252 22  
Fax: +86 21 612 253 33

**Columbia**

GRUNDFOS Colombia S.A.S.  
Km 1.5 vía Siberia-Cota Conj. Potrero  
Chico,  
Parque Empresarial Arcos de Cota Bod. 1A.  
Cota, Cundinamarca  
Tel.: +57(1)-2913444  
Fax: +57(1)-8764586

**Croatia**

GRUNDFOS CROATIA d.o.o.  
Buzinski prilaz 38, Buzin  
HR-10010 Zagreb  
Tel.: +385 1 6595 400  
Fax: +385 1 6595 499  
www.hr.grundfos.com

**Czech Republic**

GRUNDFOS Sales Czechia and Slovakia  
s.r.o.  
Čajkovského 21  
779 00 Olomouc  
Tel.: +420-585-716 111

**Denmark**

GRUNDFOS DK A/S  
Martin Bachs Vej 3  
DK-8850 Bjerringbro  
Tel.: +45-87 50 50 50  
Fax: +45-87 50 51 51  
E-mail: info\_GDK@grundfos.com  
www.grundfos.com/DK

**Estonia**

GRUNDFOS Pumps Eesti OÜ  
Peterburi tee 92G  
11415 Tallinn  
Tel.: + 372 606 1690  
Fax: + 372 606 1691

**Finland**

OY GRUNDFOS Pumput AB  
Trukkikuja 1  
FI-01360 Vantaa  
Tel.: +358-(0) 207 889 500

**France**

Pompes GRUNDFOS Distribution S.A.  
Parc d'Activités de Chesnes  
57, rue de Malacombe  
F-38290 St. Quentin Fallavier (Lyon)  
Tel.: +33-4 74 82 15 15  
Fax: +33-4 74 94 10 51

**Germany**

GRUNDFOS GMBH  
Schlüterstr. 33  
40699 Erkrath  
Tel.: +49-(0) 211 929 69-0  
Fax: +49-(0) 211 929 69-3799  
E-mail: infoservice@grundfos.de  
Service in Deutschland:  
kundendienst@grundfos.de

**Greece**

GRUNDFOS Hellas A.E.B.E.  
20th km. Athinon-Markopoulou Av.  
P.O. Box 71  
GR-19002 Peania  
Tel.: +0030-210-66 83 400  
Fax: +0030-210-66 46 273

**Hong Kong**

GRUNDFOS Pumps (Hong Kong) Ltd.  
Unit 1, Ground floor, Siu Wai industrial  
Centre  
29-33 Wing Hong Street & 68 King Lam  
Street, Cheung Sha Wan  
Kowloon  
Tel.: +852-27861706 / 27861741  
Fax: +852-27858664

**Hungary**

GRUNDFOS Hungária Kft.  
Tópark u. 8  
H-2045 Törökbálint  
Tel.: +36-23 511 110  
Fax: +36-23 511 111

**India**

GRUNDFOS Pumps india Private Limited  
118 Old Mahabalipuram Road  
Thoraiakkam  
Chennai 600 097  
Tel.: +91-44 2496 6800

**Indonesia**

PT GRUNDFOS Pompa  
Graha intirub Lt. 2 & 3  
Jln. Cililitan Besar No.454. Makasar,  
Jakarta Timur  
ID-Jakarta 13650  
Tel.: +62 21-469-51900  
Fax: +62 21-460 6910 / 460 6901

**Ireland**

GRUNDFOS (Ireland) Ltd.  
Unit A, Merrywell Business Park  
Ballymount Road Lower  
Dublin 12  
Tel.: +353-1-4089 800  
Fax: +353-1-4089 830

**Italy**

GRUNDFOS Pompe Italia S.r.l.  
Via Gran Sasso 4  
I-20060 Truccazzano (Milano)  
Tel.: +39-02-95838112  
Fax: +39-02-95309290 / 95838461

**Japan**

GRUNDFOS Pumps K.K.  
1-2-3, Shin-Miyakoda, Kita-ku  
Hamamatsu  
431-2103 Japan  
Tel.: +81 53 428 4760  
Fax: +81 53 428 5005

**Kazakhstan**

Grundfos Kazakhstan LLP  
7' Kyz-Zhibek Str., Kok-Tobe micr.  
KZ-050020 Almaty Kazakhstan  
Tel.: +7 (727) 227-98-55/56

**Korea**

GRUNDFOS Pumps Korea Ltd.  
6th Floor, Aju Building 679-5  
Yeoksam-dong, Kangnam-ku, 135-916  
Seoul, Korea  
Tel.: +82-2-5317 600  
Fax: +82-2-5633 725

**Latvia**

SIA GRUNDFOS Pumps Latvia  
Deglava biznesa centrs  
Augusta Deglava ielā 60  
LV-1035, Rīga,  
Tel.: + 371 714 9640, 7 149 641  
Fax: + 371 914 9646

**Lithuania**

GRUNDFOS Pumps UAB  
Smolensko g. 6  
LT-03201 Vilnius  
Tel.: + 370 52 395 430  
Fax: + 370 52 395 431

**Malaysia**

GRUNDFOS Pumps Sdn. Bhd.  
7 Jalan Peguam U1/25  
Glenmarie industrial Park  
40150 Shah Alam, Selangor  
Tel.: +60-3-5569 2922  
Fax: +60-3-5569 2866

**Mexico**

Bombas GRUNDFOS de México  
S.A. de C.V.  
Boulevard TLC No. 15  
Parque industrial Stiva Aeropuerto  
Apodaca, N.L. 66600  
Tel.: +52-81-8144 4000  
Fax: +52-81-8144 4010

**Netherlands**

GRUNDFOS Netherlands  
Veluwezoom 35  
1326 AE Almere  
Postbus 22015  
1302 CA ALMERE  
Tel.: +31-88-478 6336  
Fax: +31-88-478 6332  
E-mail: info\_gnl@grundfos.com

**New Zealand**

GRUNDFOS Pumps NZ Ltd.  
17 Beatrice Tinsley Crescent  
North Harbour Industrial Estate  
Albany, Auckland  
Tel.: +64-9-415 3240  
Fax: +64-9-415 3250

**Norway**

GRUNDFOS Pumper A/S  
Strømsveien 344  
Postboks 235, Leirdal  
N-1011 Oslo  
Tel.: +47-22 90 47 00  
Fax: +47-22 32 21 50

**Poland**

GRUNDFOS Pompy Sp. z o.o.  
ul. Klonowa 23  
Baranowo k. Poznania  
PL-62-081 Przeźmierowo  
Tel.: (+48-61) 650 13 00  
Fax: (+48-61) 650 13 50

**Portugal**

Bombas GRUNDFOS Portugal, S.A.  
Rua Calvet de Magalhães, 241  
Apartado 1079  
P-2770-153 Paço de Arcos  
Tel.: +351-21-440 76 00  
Fax: +351-21-440 76 90

**Romania**

GRUNDFOS Pompe România SRL  
S-PARK BUSINESS CENTER, Clădirea  
A2, etaj 2  
Str. Tipografilor, Nr. 11-15, Sector 1, Cod  
013714  
Bucuresti, Romania  
Tel.: 004 021 2004 100  
E-mail: romanian@grundfos.ro

**Serbia**

Grundfos Srbija d.o.o.  
Omladinskih brigada 90b  
11070 Novi Beograd  
Tel.: +381 11 2258 740  
Fax: +381 11 2281 769  
www.rs.grundfos.com

**Singapore**

GRUNDFOS (Singapore) Pte. Ltd.  
25 Jalan Tukang  
Singapore 619264  
Tel.: +65-6681 9688  
Fax: +65-6681 9689

**Slovakia**

GRUNDFOS s.r.o.  
Prievozská 4D 821 09 BRATISLAVA  
Tel.: +421 2 5020 1426  
sk.grundfos.com

**Slovenia**

GRUNDFOS LJUBLJANA, d.o.o.  
Leskoškova 9e, 1122 Ljubljana  
Tel.: +386 (0) 1 568 06 10  
Fax: +386 (0) 1 568 06 19  
E-mail: tehnika-si@grundfos.com

**South Africa**

GRUNDFOS (PTY) LTD  
16 Lascelles Drive, Meadowbrook Estate  
1609 Germiston, Johannesburg  
Tel.: (+27) 10 248 6000  
Fax: (+27) 10 248 6002  
E-mail: lgradidge@grundfos.com

**Spain**

Bombas GRUNDFOS España S.A.  
Camino de la Fuenteçilla, s/n  
E-28110 Algete (Madrid)  
Tel.: +34-91-848 8800  
Fax: +34-91-628 0465

**Sweden**

GRUNDFOS AB  
Box 333 (Lunnagårdsgatan 6)  
431 24 Mölndal  
Tel.: +46 31 332 23 000  
Fax: +46 31 331 94 60

**Switzerland**

GRUNDFOS Pumpen AG  
Bruggacherstrasse 10  
CH-8117 Fällanden/ZH  
Tel.: +41-44-806 8111  
Fax: +41-44-806 8115

**Taiwan**

GRUNDFOS Pumps (Taiwan) Ltd.  
7 Floor, 219 Min-Chuan Road  
Taichung, Taiwan, R.O.C.  
Tel.: +886-4-2305 0868  
Fax: +886-4-2305 0878

**Thailand**

GRUNDFOS (Thailand) Ltd.  
92 Chaloe Phrakiat Rama 9 Road  
Dokmai, Pravej, Bangkok 10250  
Tel.: +66-2-725 8999  
Fax: +66-2-725 8998

**Turkey**

GRUNDFOS POMPA San. ve Tic. Ltd. Sti.  
Gebze Organize Sanayi Bölgesi  
İhsan dede Caddesi  
2. yol 200. Sokak No. 204  
41490 Gebze/ Kocaeli  
Tel.: +90 - 262-679 7979  
Fax: +90 - 262-679 7905  
E-mail: satis@grundfos.com

**Ukraine**

ТОВ "ГРУНДФОС УКРАЇНА"  
Бізнес Центр Європа  
Столичне шосе, 103  
м. Київ, 03131, Україна  
Tel.: (+38 044) 237 04 00  
Fax: (+38 044) 237 04 01  
E-mail: ukraine@grundfos.com

**United Arab Emirates**

GRUNDFOS Gulf Distribution  
P.O. Box 16768  
Jebel Ali Free Zone, Dubai  
Tel.: +971 4 8815 166  
Fax: +971 4 8815 136

**United Kingdom**

GRUNDFOS Pumps Ltd.  
Grovebury Road  
Leighton Buzzard/Beds. LU7 4TL  
Tel.: +44-1525-850000  
Fax: +44-1525-850011

**U.S.A.**

Global Headquarters for WU  
856 Koomery Road  
Brookshire, Texas 77423 USA  
Phone: +1-630-236-5500

**Uzbekistan**

Grundfos Tashkent, Uzbekistan  
The Representative Office of Grundfos  
Kazakhstan in Uzbekistan  
38a, Oybek street, Tashkent  
Tel.: (+998) 71 150 3290 / 71 150 3291  
Fax: (+998) 71 150 3292

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