

PVC-Injectors 70-200

with non-return diaphragm

545-2816, 545-5816;

545-2916, 545-5916;

545-2016, 545-5016

Ⓒ Installation and operating instructions



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Warning

Prior to installation, read these installation and operating instructions. Installation and operation must comply with local regulations and accepted codes of good practice.

1. General

1.1 Structure of the documentation

The documentation for Grundfos Alldos PVC injectors consists of:

- The information document "Operation and safety of chlorine systems":
 - General safety instructions for dealing with chlorine
- and the installation and operating instructions (this document):
 - Technical data
 - Commissioning and operating instructions
 - Device-specific safety instructions
 - Instructions on maintenance, servicing and repair

If you require further information or if any problems arise that are not discussed in sufficient detail in this document, please contact GRUNDFOS ALLDOS directly for the necessary information.

1.2 Guarantee

The guarantee period lasts 12 months from the date of delivery by GRUNDFOS ALLDOS.

A guarantee claim in the sense of our general conditions of sale and delivery can only be recognised if:

- The device is used according to the information in these operating instructions,
 - The device is not opened or handled incorrectly in any manner,
 - Repairs are only carried out by authorised and qualified personnel,
 - Only original spare parts are used for repairs,
 - Only components approved by GRUNDFOS ALLDOS are used throughout the entire gas dosing system,
- Typical parts subject to wear are excluded from the guarantee, e.g.
- Seals, O-rings,
 - The injector nozzle, as its degree of wear depends heavily on local water quality

2. Safety information



Warning

Read the GRUNDFOS ALLDOS information document "Operation and safety of chlorine systems" before commissioning.

2.1 Application of the device

GRUNDFOS ALLDOS PVC injectors are used to inject Cl₂, NH₃ and SO₂ gas into water in water treatment systems within the framework of the applications described in these operating instructions.

The media that may be used with each model are specified on the type plate.



Warning

Other applications are considered as non-approved, and are not permissible. Grundfos Alldos accepts no liability for any damage resulting from incorrect use.

2.2 Obligations of the operator

The operator of the system is responsible for

- Complying with the following regulations:
 - Regulation for the prevention of accidents, chlorination of water (GUV 8.15)
 - Regulation for the prevention of accidents, pressure vessel (GUV 2.6)
 - Regulation for the prevention of accidents, gases (GUV 9.9)
 - Ordinance on workplaces (ArbStättV)
 - Ordinance on hazardous industrial substances (ArbStättV)
 - If required, compliance with additional country-specific regulations
- Training of operating personnel
- Provision of mandatory protective gear (information document "Operation and safety of chlorine systems")
- Arranging regular maintenance.

3. Technical data

Criteria for the selection of an injector are

- Suction power
- Counterpressure

- Motive water pressure (admission pressure)

Values for the injectors described here can be found in the dimensioning tables.

3.1 General data

Dosing medium	Cl ₂
Motive water pressure	See dimensioning tables, section 10
Counterpressure	See dimensioning tables, section 10

Permitted motive water temperature	+5°C to +30°C
Permitted ambient temperature	+5°C to +40°C
Gas dosing system	GS 145

3.2 Suction powers / connections

Injector	Maximum suction power	Motive water connection (Input, output)	Gas connection
545-2816	70kg/h Cl ₂	Flange DN 65	PVC pipe DN40
545-5816	70kg/h Cl ₂	Flange DN 65	PVC pipe DN40
545-2916	120kg/h Cl ₂	Flange DN 80	PVC pipe DN40
545-5916	120kg/h Cl ₂	Flange DN 80	PVC pipe DN40
545-2016	200kg/h Cl ₂	Flange DN 100	PVC pipe DN40
545-5016	200kg/h Cl ₂	Flange DN 100	PVC pipe DN40

3.3 Dimensions

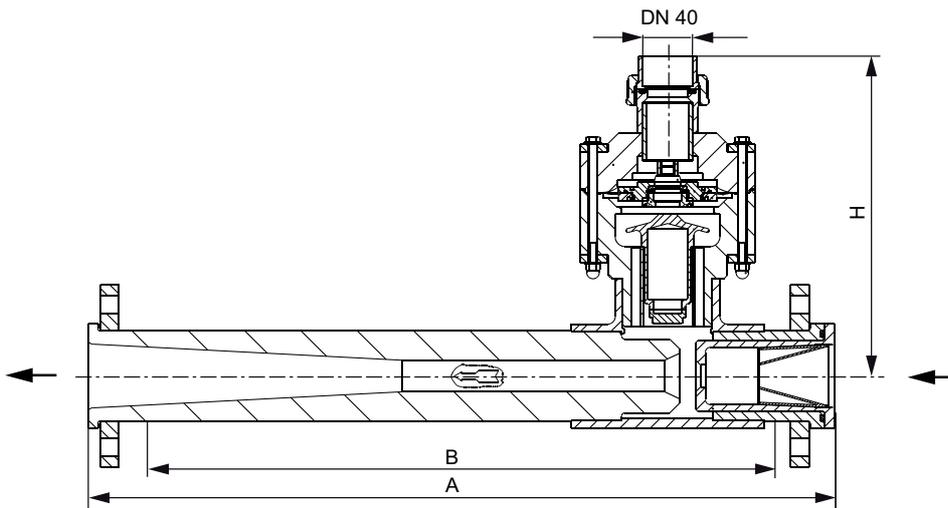


fig. 1 Dimensional drawings: 70-200 kg/h injectors

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A	Overall length
B	Fitting distance
H	Height

3.3.3 Injectors up to 200kg/h Cl₂

Injector	A (mm)	B (mm)	H (mm)
545-2016	825	480	370
545-5016	825	480	370

3.3.1 Injectors up to 70kg/h Cl₂

Injector	A (mm)	B (mm)	H (mm)
545-2816	650	370	325
545-5816	650	370	325

3.3.2 Injectors up to 120kg/h Cl₂

Injector	A (mm)	B (mm)	H (mm)
545-2916	720	400	325
545-5916	720	400	325

4. Installation

4.1 Transport and storage

- Transport the unit carefully. Never throw it.
- Store in a cool, dry location.

4.2 Unpacking

- Note when unpacking:
 - Do not allow moisture to enter the gas connection.
 - Do not allow foreign bodies to enter the connections.
 - Keep the injector horizontal so that the inserted nozzle does not fall out.
- Assemble as soon as possible following unpacking.

4.3 Assembling

4.3.1 Assembly requirements

Caution Keep the solution outlet from the injector to the injection unit as short as possible.

Caution Only use sand-free, fresh water; if necessary connect a dirt trap to the water apparatus.

Caution Ensure sufficient motive water and motive water pressure (admission pressure). Fit pressure booster pump if necessary.

Note To avoid a drop in output: Observe the prescribed line cross-sections. Observe the line cross-sections and lengths for the gas supply.

4.3.2 Fitting the injector

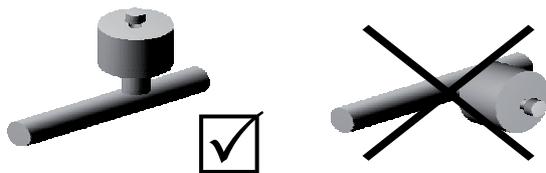


fig. 2 Position of diaphragm non-return 70-200 kg/h



Observe flow direction (arrow sticker). Diaphragm non-return must be vertical.

- Fit the injector to the wall or other suitable location using the fixing materials (optional accessory).

Caution Fit and connect the injector so it is not subjected to strain.

- Connect the motive water line (3),
 - Connect the gas solution line (6),
 - Connect the (1) gas supply,
- See 6.1.2 Components. Injection unit

5. Commissioning

5.1 Preparations for commissioning

For commissioning, all components of the entire system must be ready for operation.

Caution Observe the operating instructions for the other components.

5.2 Checks before commissioning

Check the tightness of the whole system before commissioning.



Warning Only check for tightness when the entire system is ready for operation. Risk of gas leak.

Observe the operating instructions for the other components.

5.2.1 Checking the gas solution line for tightness



Warning System must be switched off. All tank valves must be closed.

- Loosen the union nut (pos. 110, see fig. 6) on the gas connection.
 - Disconnect the gas supply
 - Open the motive water valve
 - Open the injection unit isolating valve
 - Switch on the motive water pump
- If water escapes from between the motive water pump (3) and the injection unit (9): Leak in the line.

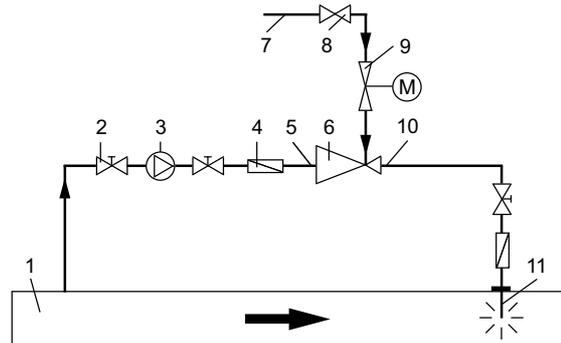


fig. 3 System diagram

1	Supply line
2	Isolating valve
3	Motive water pump
4	Check-back valve
5	Motive water input injector
6	Injector
7	Gas supply
8	Safety pressure relief valve
9	Gas dosing system
10	Gas solution line (motive water output injector)
11	Injection unit

- Switch off the motive water pump
- Close the motive water valve
- Close the injection unit isolating valve
- Repair the leak
- Repeat check for tightness.

If no water escapes: Line is watertight.

- Reconnect the gas supply

5.2.2 Checking the diaphragm non-return

- Loosen the union nut (pos. 110, see fig. 6) on the gas connection.
- Disconnect the gas supply
- Open the motive water valve
- Open the injection unit isolating valve
- Switch on the motive water pump
- Briefly shut the injection unit isolating valve

If water escapes from the gas connection: Faulty diaphragm non-return.

- Switch off the motive water pump
- Close the motive water valve
- Repair the diaphragm non-return (section 7, maintenance).
- Repeat check.

If no water escapes: Diaphragm non-return is in working order. Reconnect the gas supply

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5.2.3 Checking the operation of the injector



Do not touch the gas connection while the injector is in operation.
Danger of injuries.

- Loosen the union nut (pos. 110, see fig. 6) on the gas connection.
- Disconnect the gas supply
- Open the motive water valve
- Open the injection unit isolating valve
- Switch on the motive water pump

- Place a small, clean plate (not sharp edged, approx. 5 mm thick, e.g. PVC) on the connection

Injector does not suck:

- Check the admission pressure (water quantity)
- Check the counterpressure
- Check the line lengths and cross-sections
- See section 6.3 Possible errors

If the fault cannot be rectified:

- Contact the Grundfos Alldos service centre

Plate is sucked in forcefully: Injector is in working order.

6. Operation

6.1 Unit description

6.1.1 How it operates

By reducing the line cross-section with the aid of a nozzle, the motive water is accelerated and creates a low pressure. This low pressure sucks in the gas. This gas is then agitated by the diffuser and is mixed with the motive water in the downstream mixing section to produce process water.

6.1.2 Components

- Nozzle (4)
 - Accelerates the motive water flow and creates a low pressure
- Diffuser with mixing section (5)
 - Mixes motive water with gas
- Body with diaphragm and ball check (2)
 - The diaphragm non-return prevents water from entering gas-conveying parts of the device
- Gas supply connection (1)
- Motive water connection - input (3)
- Gas solution line connection = motive water output (6)

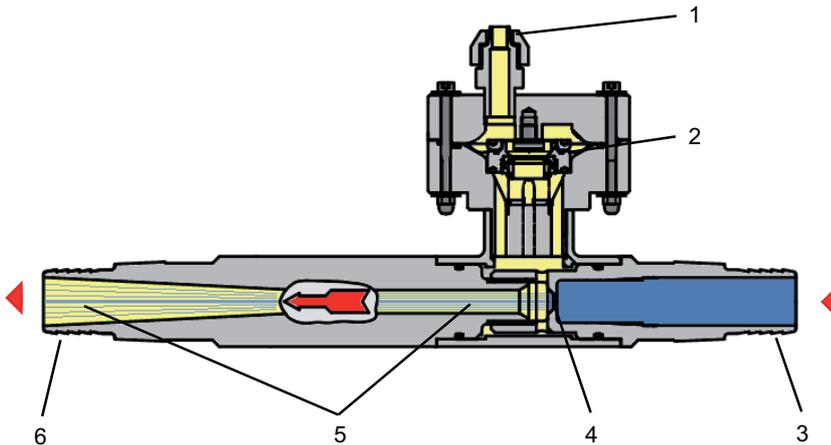


fig. 4 Injector operating diagram

6.2 Operation

Note

The device is passive. All settings must be made on other parts of the system. Observe the operating instructions for other components.

6.3 Possible errors

Error	Cause	Remedy
Maximum dosing flow is not achieved despite correctly selected injector.	Swirl unit in the nozzle damaged or not present.	Insert new swirl unit
	Counterpressure on the injector is too high (solution outlet too long or line cross-section too small).	Bring the injector closer to the injection unit, observe the line cross-sections
	Motive water pressure or quantity not correctly set.	Check the settings using the dimensioning table
	Dynamic pressure on the injector too low due to line loss.	Check length and cross-section of motive water and solution line, use the least possible number of elbows.
	Process water temperature higher than 30 °C.	Adjust process water temperature to approx. 20 - 25 °C
	The dynamic pressure created in the injector is too low due to faulty gas supply.	Replace the gas supply

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7. Maintenance



Warning
The whole system must be turned off before carrying out any cleaning or maintenance work.
Risk of gas leak.



Warning
Before recommissioning carry out check for tightness.
Risk of gas leak.

7.1 Intervals for cleaning and maintenance

Component	Normal use	Heavy use
	Admission pressure up to 6 bar, Drinking water quality motive water	Admission pressure up to 6 bar, Poor motive water quality
Upstream dirt trap	Every 12 weeks	Every 8 weeks
Nozzle sets	Every 12 weeks	Every 8 weeks
Diaphragm non-return	Every 6 months	Every 6 months

- Additional cleaning and maintenance in the event of faults.

Local circumstances (poor water quality, extreme pressure conditions) may shorten the maintenance intervals.

Note

7.2 Cleaning the nozzle

Deposits prevent the injector from creating the required low pressure, leading to drop in output.

- Recommended cleaning agent: Hydrochloric acid



Warning
Observe the regulations when using hydrochloric acid.

Caution Do not use sharp objects for cleaning.

- Disconnect the gas supply.
- Loosen the water line (on injectors with a tube connection: loosen the tube) and remove the injector.
- Unscrew the nozzle (pos 210, see fig. 6).
 - Leave the swirl unit (220, see fig. 6) in the nozzle.
- Clean the nozzle with hydrochloric acid.
- Reassemble and fit the injector in the reverse order.

7.3 Diaphragm non-return

Regular checks are necessary due to wear to the piston, seat and diaphragm(s). The checks must be carried out approx. twice a year.

Caution

7.3.1 Checking the closing mechanism

- Close the adjustment valve on the dosing system.
- Loosen the union nut (110, see fig. 6).
- Disconnect the gas supply.
- Briefly close the isolating valve behind the injector several times.
 - If no water escapes: Diaphragm non-return is in working order.
 - If water escapes:

Replace piston (120, see fig. 6) and seat (060, see fig. 6).

- Open the isolating valve.
- Connect the gas supply.
- Set the adjustment valve on the dosing system to the required dosing flow.

7.3.2 Changing the piston

Do not use tools when screwing in the piston.

Caution If the piston surface is damaged, the closing mechanism may not work.

- Shut down the system.
- Close the isolating valve behind the injector
- Loosen the cap nut (200, see fig. 6).
- Remove the cheese head screw (140, see fig. 6).
- Unscrew the upper part (090, see fig. 6)

- Screw in a new piston (by hand)
 - If necessary, replace the O-ring (160, see fig. 6).
- Push the diaphragm disc (pos. 170, see fig. 6) (with diaphragm, seat, screw part and O-ring) onto the piston
 - Turn the diaphragm disc so that the holes line up with the drill holes in the upper part
- Fit the upper part and diaphragm disc
- Slightly tighten the screws diagonally

7.3.3 Changing the seat and diaphragm

- Shut down the system
- Close the isolating valve behind the injector
- Loosen the cap nut (200, see fig. 6).
- Remove the cheese head screw (140, see fig. 6).
- Remove the upper part (090, see fig. 6).

Changing the diaphragms

- Unscrew the diaphragm ring (080, see fig. 6)
- Check the O-ring (070, see fig. 6).
 - Replace the O-ring if necessary
- Remove the diaphragm (130, see fig. 6)
- Insert the new diaphragm

Caution Observe mounting position.

- Firmly tighten the diaphragm ring (080, see fig. 6)

Changing the seat

- Unscrew the screw part (050, see fig. 6)
- Remove seat (060, see fig. 6) and O-ring
- Insert new seat and O-ring

Caution Observe mounting position.

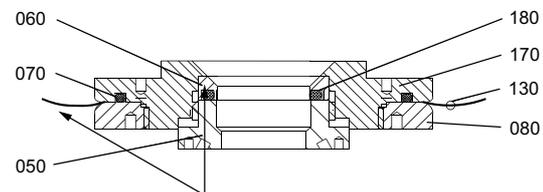


fig. 5 Diaphragm assembly: 70-200 kg/h injectors

- Tighten the diaphragm ring so that the seat can be pushed firmly yet smoothly over the piston.

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8. Spare parts

We recommend that you keep some spare parts in stock to ensure that worn parts can be replaced quickly when necessary.

8.1 Injectors up to 200kg/h

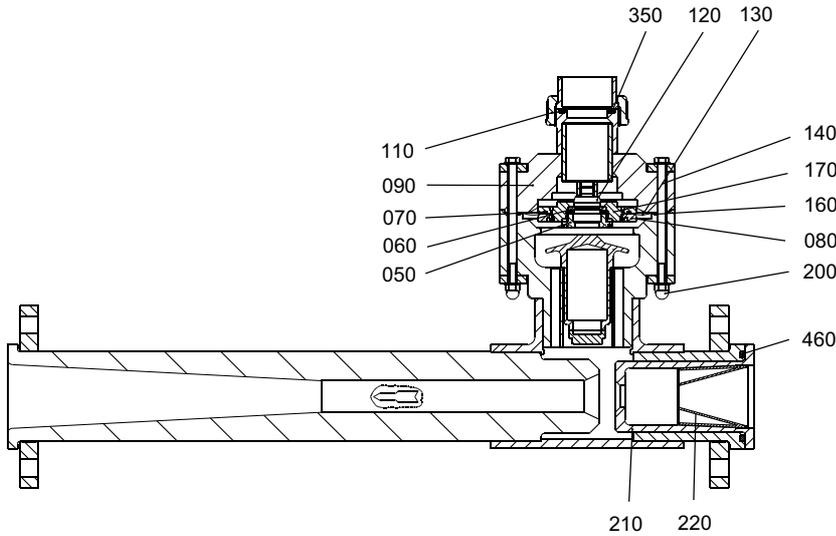


fig. 6 Assembly diagram, 545-2816 /-5816 /-2916 /-5916 /-2016 /-5016 injectors

The spare parts sets for the 70-200 kg/h injectors have the following order numbers:

Spare parts set		
Suction power	Injector	Order no.
70kg/h	545-2816 / -5816	553-1042 / 96688743
120kg/h	545-2916 / -5916	553-1045 / 96688745

Spare parts set		
Suction power	Injector	Order no.
200kg/h	545-2016 /-5016	553-1047 / 96688747

They each contain the following parts:

No.	Designation	Pieces
060	Seat	1
070	O-ring (80x86)	1
120	Piston	1
130	Separating diaphragm	1
160	O-ring (135x140)	1
180	O-ring (28x35)	1

No.	Designation	Pieces
350	O-ring (47x58)	1
460 (70kg/h)	O-ring (82x93)	1
460 (120kg/h)	O-ring (101x112)	1
460 (200kg/h)	O-ring (120x134)	1
470	Flat gasket	2

9. Accessories (optional)

The mounting set for the 70-200 kg/h injectors has the following order numbers:

Mounting set		
Suction power	Injector	Order no.
70kg/h	545-2816 / -5816	553-1044 / 96688744
120kg/h	545-2916 / -5916	553-1046 / 96688746
200kg/h	545-2016 / -5016	553-1048 / 96729323

Each mounting set contains the following parts:

Designation	Pieces
Console	2
Hexagon nut	4
Collar	4
Pipe clamp	2
Threaded rod	2
Dowel pin	4
Wood screw	4

10. Dimensioning tables

Criteria for the selection of an injector are

- Suction power
- Counterpressure
- Motive water pressure (admission pressure)

When dimensioning an injector, the required suction power and counterpressure is generally specified.

Other parameters such as motive water pressure and water quantity per hour can be found in the dimensioning tables.

Example:

See table 10.1, injectors 70 kg/h Cl₂.

To achieve a suction power of 70 kg/h Cl₂ with a counterpressure of 2.8 bar, a motive water pressure (admission pressure) of 7 bar and a water quantity of 34.5 m³/h is required.

Note

All data refers to drinking water quality motive water.

10.1 Injectors up to 70 kg/h Cl₂

10.1.1 Type 545-2816

Counterpressure (bar)	Motive water pressure (bar)	Water quantity (m ³ /h)
0.5	3	23
1.2	4	26.5
1.8	5	29.5
2.3	6	32

Counterpressure (bar)	Motive water pressure (bar)	Water quantity (m ³ /h)
0.5	3	23
2.8	7	34.5
3.3	8	37

10.1.2 Type 545-5816

Counterpressure (bar)	Motive water pressure (bar)	Water quantity (m ³ /h)
3.5	9	26
4.2	10	27.5
4.7	11	29
5.3	12	30

Counterpressure (bar)	Motive water pressure (bar)	Water quantity (m ³ /h)
5.8	13	31.5
6.3	14	32.5
6.8	15	33.5
7.3	16	35

10.2 Injectors 120kg/h Cl₂

10.2.1 Type 545-2916

Counterpressure (bar)	Motive water pressure (bar)	Water quantity (m ³ /h)
0.5	3	40
1.2	4	45
1.8	5	50

Counterpressure (bar)	Motive water pressure (bar)	Water quantity (m ³ /h)
2.3	6	55
2.8	7	59
3.3	8	63

10.2.2 Type 545-5916

Counterpressure (bar)	Motive water pressure (bar)	Water quantity (m ³ /h)
3.5	9	45
4.2	10	47
4.7	11	49
5.3	12	52

Counterpressure (bar)	Motive water pressure (bar)	Water quantity (m ³ /h)
5.8	13	54
6.3	14	56
6.8	15	58
7.3	16	60

10.3 Injectors 200kg/h Cl₂

10.3.1 Type 545-2016

Counterpressure (bar)	Motive water pressure (bar)	Water quantity (m ³ /h)
0.5	3	80
1.2	4	91
1.8	5	100

10.3.2 Type 545-5016

Counterpressure (bar)	Motive water pressure (bar)	Water quantity (m ³ /h)
3.5	9	89
4.2	10	94
4.7	11	100
5.3	12	105

Counterpressure (bar)	Motive water pressure (bar)	Water quantity (m ³ /h)
2.3	6	110
2.8	7	118
3.3	8	125

Counterpressure (bar)	Motive water pressure (bar)	Water quantity (m ³ /h)
5.8	13	110
6.3	14	115
6.8	15	120
7.3	16	125

Subject to alterations.

Argentina

Bombas GRUNDFOS de Argentina S.A.
Ruta Panamericana km. 37.500 Lote 34A
1619 - Garin
Pcia. de Buenos Aires
Phone: +54-3327 414 444
Telefax: +54-3327 411 111

Australia

Grundfos Alldos
Dosing & Disinfection
ALLDOS Oceania Pty. Ltd.
Unit 3 / 74 Murdoch Circuit
Acacia Ridge QLD 4100
Phone: +61 (0)7 3712 6888
Telefax: +61 (0)7 3272 5188
E-mail: alldos.au@alldos.com

Australia

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

Austria

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

Belgium

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

Belorussia

Представительство ГРУНДФОС в Минске
220123, Минск,
ул. В. Хоружей, 22, оф. 1105
Тел.: + (37517) 233 97 65
Факс: (37517) 233 9769
E-mail: grundfos_minsk@mail.ru

Bosnia/Herzegovina

GRUNDFOS Sarajevo
Trg Heroja 16,
BiH-71000 Sarajevo
Phone: +387 33 713 290
Telefax: +387 33 659 079
e-mail: grundfos@bih.net.ba

Brazil

Mark GRUNDFOS Ltda.
Av. Humberto de Alencar Castelo Branco,
630
CEP 09850 - 300
São Bernardo do Campo - SP
Phone: +55-11 4393 5533
Telefax: +55-11 4343 5015

Bulgaria

GRUNDFOS Pumpen Vertrieb
Representative Office - Bulgaria
Bulgaria, 1421 Sofia
Lozenetz District
105-107 Arsenalski Blvd.
Phone: +359 2963 3820, 2963 5653
Telefax: +359 2963 1305

Canada

GRUNDFOS Canada Inc.
2941 Brighton Road
Oakville, Ontario
L6H 6C9
Phone: +1-905 829 9533
Telefax: +1-905 829 9512

China

Grundfos Alldos
Dosing & Disinfection
ALLDOS (Shanghai) Water Technology Co.
Ltd.
West Unit, 1 Floor, No. 2 Building (T 4-2)
278 Jinhua Road, Jin Qiao Export Processing
Zone
Pudong New Area
Shanghai, 201206
Phone: +86 21 5055 1012
Telefax: +86 21 5032 0596
E-mail: alldos.cn@alldos.com

China

GRUNDFOS Pumps (Shanghai) Co. Ltd.
22 Floor, Xin Hua Lian Building
755-775 Huai Hai Rd, (M)
Shanghai 200020
PRC
Phone: +86-512-67 61 11 80
Telefax: +86-512-67 61 81 67

Croatia

GRUNDFOS CROATIA d.o.o.
Cebini 37, Buzin
HR-10010 Zagreb
Phone: +385 1 6595 400
Telefax: +385 1 6595 499
www.grundfos.hr

Czech Republic

GRUNDFOS s.r.o.
Čapkovského 21
779 00 Olomouc
Phone: +420-585-716 111
Telefax: +420-585-716 299

Denmark

GRUNDFOS DK A/S
Martin Bachs Vej 3
DK-8850 Bjerringbro
Tlf.: +45-87 50 50 50
Telefax: +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
Mestariintie 11
FIN-01730 Vantaa
Phone: +358-3066 5650
Telefax: +358-3066 56550

France

Grundfos Alldos
Dosing & Disinfection
ALLDOS S.A.R.L.
7, rue Gutenberg
F-67610 La Wantzenau
Tél.: +33-3 88 59 26 26
Télécopie: +33-3 88 59 26 00
E-mail: alldos.fr@alldos.com

France

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

Germany

Grundfos Alldos
Dosing & Disinfection
ALLDOS Eichler GmbH
Reetzstraße 85
D-76327 Pfingsttal (Söllingen)
Tel.: +49 7240 61-0
Telefax: +49 7240 61-177
E-mail: alldos.de@alldos.com

Germany

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

Greece

GRUNDFOS Hellas A.E.B.E.
20th km. Athinon-Markopoulou Av.
P.O. Box 71
GR-19002 Peania
Phone: +0030-210-66 83 400
Telefax: +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
Phone: +852-27861706 / 27861741
Telefax: +852-27858664

Hungary

GRUNDFOS Hungária Kft.
Park u. 8
H-2045 Törökbalint,
Phone: +36-23 511 110
Telefax: +36-23 511 111

India

GRUNDFOS Pumps India Private Limited
118 Old Mahabalipuram Road
Thoraiappakkam
Chennai 600 096
Phone: +91-44 2496 6800

Indonesia

PT GRUNDFOS Pompa
Jl. Rawa Sumur III, Blok III / CC-1
Kawasan Industri, Pulogadung
Jakarta 13930
Phone: +62-21-460 6909
Telefax: +62-21-460 6910 / 460 6901

Ireland

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

Italy

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

Japan

GRUNDFOS Pumps K.K.
Gotanda Metalion Bldg. 5F,
5-21-15, Higashi-gotanda
Shiagawa-ku, Tokyo,
141-0022 Japan
Phone: +81 35 448 1391
Telefax: +81 35 448 9619

Korea

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

Latvia

SIA GRUNDFOS Pumps Latvia
Deglava biznesa centrs
Augusta Deglava ielā 60, LV-1035, Rīga,
Tālr.: + 371 714 9640, 7 149 641
Fakss: + 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
Phone: +60-3-5569 2922
Telefax: +60-3-5569 2866

México

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

Netherlands

Grundfos Alldos
Dosing & Disinfection
ALLDOS BV
Leerlooiersstraat 6
NL-8601 WK Sneek
Tel.: +31-51 54 25 789
Telefax: +31-51 54 30 550
E-mail: alldos.nl@alldos.com

Netherlands

GRUNDFOS Netherlands
Veluwezoom 35
1326 AE Almere
Postbus 22015
1302 CA ALMERE
Tel.: +31-88-478 6336
Telefax: +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
Phone: +64-9-415 3240
Telefax: +64-9-415 3250

Norway

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

Poland

GRUNDFOS Pompy Sp. z o.o.
ul. Klonowa 23
Baranowo k. Poznania
PL-62-081 Przemierowo
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
Telefax: +351-21-440 76 90

România

GRUNDFOS Pompe România SRL
Bd. Biruintei, nr 103
Bartolimon county Ilfov
Phone: +40 21 200 4100
Telefax: +40 21 200 4101
E-mail: romania@grundfos.ro

Russia

ООО Грундфос
Россия, 109544 Москва, ул. Школьная 39
Тел. (+7) 495 737 30 00, 564 88 00
Факс (+7) 495 737 75 36, 564 88 11
E-mail grundfos.moscow@grundfos.com

Serbia

GRUNDFOS Predstavništvo Beograd
Dr. Milutina Ivkovića 2a/29
YU-11000 Beograd
Phone: +381 11 26 47 877 / 11 26 47 496
Telefax: +381 11 26 48 340

Singapore

GRUNDFOS (Singapore) Pte. Ltd.
24 Tuas West Road
Jurong Town
Singapore 638381
Phone: +65-6865 1222
Telefax: +65-6861 8402

Slovenia

GRUNDFOS PUMPEN VERTRIEB
Ges.m.b.H.,
Podružnica Ljubljana
Šlandrova 8b, SI-1231 Ljubljana-Crnuče
Phone: +386 1 568 0610
Telefax: +386 1 568 0619
E-mail: slovenia@grundfos.si

South Africa

Grundfos Alldos
Dosing & Disinfection
ALLDOS (Pty) LTD
98 Matroosberg Road, Waterkloof Park
P.O. Box 36505, Menlo Park 0102
0181 ZA Pretoria
E-mail: alldos.za@alldos.com

Spain

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

Sweden

GRUNDFOS AB
(Box 333) Lunnagårdsgatan 6
431 24 Mölndal
Tel.: +46(0)771-32 23 00
Telefax: +46(0)31-331 94 60

Switzerland

Grundfos Alldos
Dosing & Disinfection
ALLDOS International AG
Schönmattdstraße 4
CH-4153 Reinach
Tel.: +41-61-717 5555
Telefax: +41-61-717 5500
E-mail: alldos.ch@alldos.com

Switzerland

GRUNDFOS Pumpen AG
Bruggacherstrasse 10
CH-8117 Fällanden/ZH
Tel.: +41-1-808 8111
Telefax: +41-1-806 8115

Taiwan

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

Thailand

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

Turkey

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

Ukraine

ТОВ ГРУНДФОС УКРАЇНА
01010 Київ, Вул. Московська 86,
Тел.: (+38 044) 390 40 50
Факс: (+38 044) 390 40 59
E-mail: ukraine@grundfos.com

United Arab Emirates

GRUNDFOS Gulf Distribution
P.O. Box 16768
Jebel Ali Free Zone
Dubai
Phone: +971-4- 8815 166
Telefax: +971-4-8815 136

United Kingdom

Grundfos Alldos
Dosing & Disinfection
ALLDOS Ltd.
39 Gravelly Industrial Park, Tyburn Road
Birmingham B24 8TG
Phone: +44-121-3283336
Telefax: +44-121-3284332
E-mail: alldos.uk@alldos.com

United Kingdom

GRUNDFOS Pumps Ltd.
Grovebury Road
Leighton Buzzard/Beds. LU7 8TL
Phone: +44-1525-850000
Telefax: +44-1525-850011

U.S.A.

GRUNDFOS Pumps Corporation
17100 West 118th Terrace
Olathe, Kansas 66061
Phone: +1-913-227-3400
Telefax: +1-913-227-3500

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