

Vaccuperm VGA-113

Gas dosing regulator

GB Service instructions





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Warning

These operating instructions are also available on www.Grundfosalldos.com.

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

1. Of general interest

1.1 Structure of the documentation

The Grundfos Alldos device VGA-113 is a state-of-the-art solution, which complies with recognised safety regulations. Conformity with applicable standards, directives and laws has been verified.

Nevertheless, certain risks which cannot be prevented by the manufacturer are associated with the use of the system.

Purpose of this manual:

- Inform users of optimum use.
- Warn users of possible residual risks when using correctly and identify measures that should be taken to avoid damage.
- Caution users against obvious misuse or inappropriate use and inform them of the necessary care that must be taken when operating the system.

1.2 About this manual

This manual contains the following standardised safety instructions about possible residual risks:



Warning

If these safety instructions are not observed, it may result in personal injury!

Caution

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

Note

Notes or instructions that make the job easier and ensure safe operation.

Information about possible residual risks is provided:

- On warning signs displayed in the installation location.
- At the start of each section in this manual.
- Directly before any operating procedures that could involve residual risks.

1.3 User/target groups

Users are persons who are responsible for operating and monitoring the device VGA-113 at the installation location.

The system may only be operated by trained and qualified personnel. Personnel must have appropriate technical knowledge and be familiar with the basic principles of measuring and control technology.

1.3.1 Responsibilities of the users

The users' responsibilities:

- Read this manual before operating the VGA-113.
- Be trained by qualified personnel from Grundfos Alldos in the operation of the system.
- Observe the recognised regulations governing safety in the workplace and accident prevention.
- Wear appropriate protective clothing in accordance with national regulations for the prevention of accidents when operating the system and handling chemicals (German GUV-V D05).

1.4 Responsibilities of the operator

The owner of the building or operator of the VGA-113 is responsible for the following:

- Consider this manual to be part of the product and ensure that it is kept clearly accessible in the immediate vicinity of the system for the entire service life of the system.
- Meet the installation requirements specified by the manufacturer (required water connections and fittings, environmental conditions, electrical connection, protective pipe for dosing line if necessary, audible or optical warning device for alarm messages if necessary).
- Ensure that water lines and fixings are regularly checked, serviced and maintained.
- Obtain official approval for storing chemicals, if necessary.
- Train users in the operation of the system.
- Ensure that the regulations for the prevention of accidents are observed in the installation location (German GUV-V D05 regulation for the prevention of accidents, "Chlorination of Water" dated January 1997).
- Provide all users and service personnel with protective clothing in accordance with GUV-V D05 (face mask, gloves, protective apron).

1.5 Maintenance and service personnel

The system may only be maintained and serviced by authorised service personnel from Grundfos Alldos.

1.6 Correct usage

The Grundfos Alldos VGA-113 may be used for dosing chlorine (Cl₂) as being described in this manual.

1.7 Inappropriate usage

Applications other than those listed in section 1.6 *Correct usage* are considered not to be in accordance with the intended use and are not permitted. The manufacturer, Grundfos Alldos, accepts no liability for any damage resulting from incorrect use.

The system comprises state-of-the-art components and has undergone safety-related testing.

Warning



Unauthorised structural modifications to the system may result in serious damage to equipment and personal injury.

It is forbidden to open, modify, change the structure of, bridge, remove, bypass or disable components, especially safety equipment.

2. Technical Data

2.1 Type key VGA-113

Example: Gas dosing regulator Type key VGA-113-100/M0, Y

Code	Example	VGA-113	-100	/M	0	-N
	Vaccuperm Gas Advanced = VGA					
	Dosing flow					
25	1-25 g/h					
40	2-40 g/h					
100	5-100 g/h					
250	10-250 g/h					
500	25-500 g/h					
1000	50-1000 g/h					
2000	100-2000 g/h					
3000	150-3000 g/h					
4000	400-4000 g/h					
	Adjustment					
M	Manual					
A	Automatic, 230-240V/50-60Hz					
B	Automatic, 110-115V/50-60Hz					
	Control					
0	Without					
1	4-20 mA					
2	Direct					
	Differential pressure regulator					
Y	Yes, with vaccumeter					
N	No					

2.2 General Data

Permissible medium	Cl ₂
Accuracy	± 4% of upper limit
Control range	1:20
Flow meter	according to the floater principle, length of the measuring tube 70 mm
Weight	0.9 kg
Vacuum connection (from the vac. reg.)	for hose 8/11
Vacuum connection (to the injector)	for hose 8/11
Weight without Servomotor	0.9 kg
Weight with Servomotor	3.1 kg
Permissible vacuum regulator	e.g. VGA-111

2.2.1 Dosing flow

1.5 - 25 g/h	0.07 - 1.3 lbs/day
2 - 40 g/h	0.1 - 2 lbs/day
5 - 100 g/h	0.2 - 5 lbs/day
10 - 250 g/h	0.5 - 14 lbs/day
25 - 500 g/h	1.5 - 26 lbs/day
50 - 1000 g/h	2.5 - 50 lbs/day
100 - 2000 g/h	5 - 100 lbs/day
150 - 3000 g/h	10 - 150 lbs/day
400 - 4000 g/h	30 - 220 lbs/day

2.2.2 Accessories (not including)

Installation material: Hoses of different lengths
Holding plate for wall fixing at change of container
Test medium for leak search

2.3 Dimensioned drawings

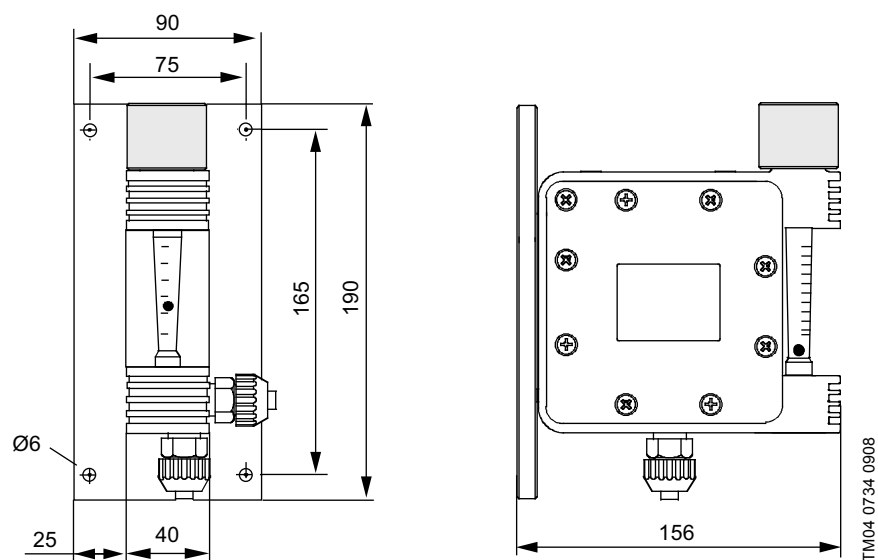


Fig. 1 Dimensional drawing dosing regulator VGA 113

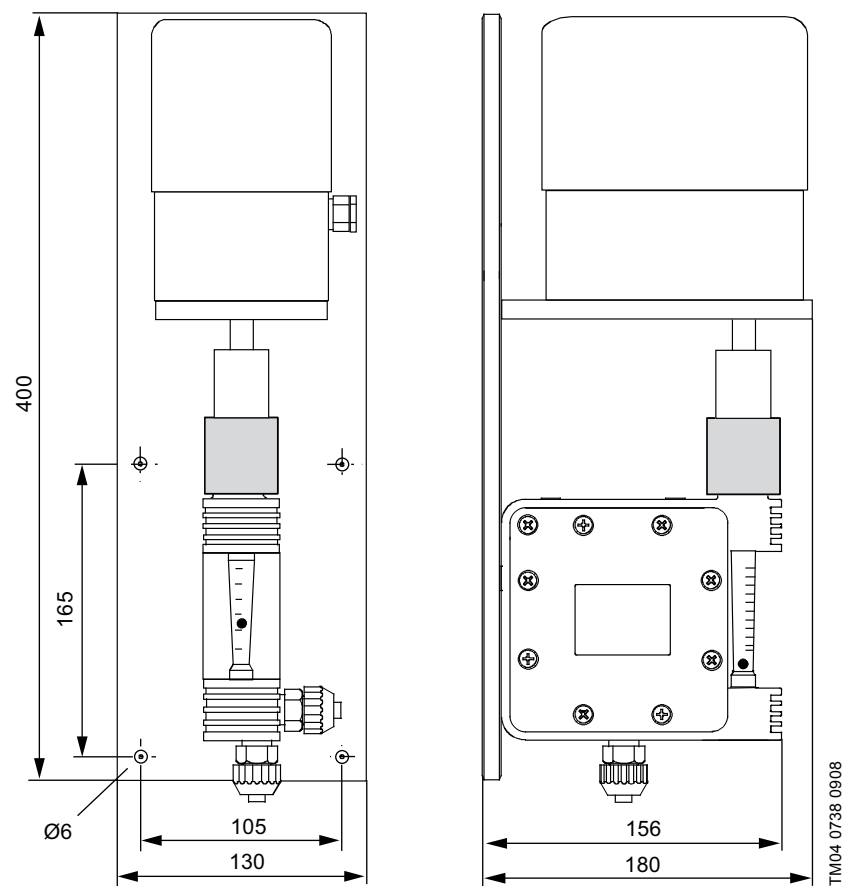


Fig. 2 Dosing regulator with servomotor

2.4 Electrical data

2.4.1 Electrical data for VGA-113

Servomotor	Synchronous motor with limit switches
Current input	4 - 20 mA
Actuating time 0-100 %	ca.95 s (50 Hz), ca. 76 s (60 Hz)
Power consumption	3 VA
Degree of protection	IP 55
Permissible ambient temperature	0°C to +50°C

Type key	Voltage	Nominal current
VGA-113-XXX/A1, N	230 V (50/60 Hz)	0.011 A
VGA-113-XXX/B1, N	115 V (50/60 Hz)	0.022 A

2.4.2 Electrical data for VGA-113

Servomotor	Synchronous motor with limit switches
Feedback potentiometer	Single potentiometer
Actuating time 0-100 %	ca.95 s (50 Hz), ca. 76 s (60 Hz)
Power consumption	3 VA
Degree of protection	IP 55
Permissible ambient temperature	0°C to +50°C

Type key	Voltage	Nominal current
VGA-113-XXX/A2, N	230 V (50/60 Hz)	0.011 A
VGA-113-XXX/B2, N	115 V (50/60 Hz)	0.022 A

3. Installation

3.1 Transport and storage

- Handle with care, don't throw!
- Dry and cool storage place.

3.2 Unpacking

- Observe when unpacking
 - No humidity should get into gas-leading parts!
 - No foreign matter should get into gas-leading parts!
- Mount as soon as possible after unpacking.

3.3 Typical installations

Vacuum and dosing regulator

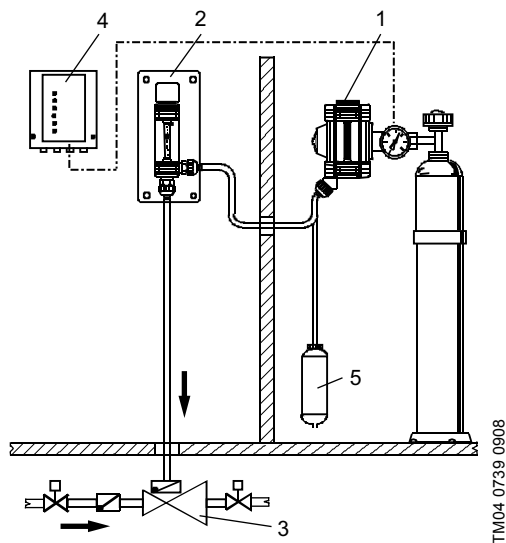


Fig. 3 Vacuum regulator and dosing regulator

Item	Description
1	Vacuum regulator e.g. VGA-111 (with contact pressure gauge)
2	Dosing regulator VGA 113
3	Injector
4	Remote display for container empty indication
5	Adsorption device

3.4 Mounting



Warning

Please read *Installation and operating instruction, Chapter 2: Handling Chlorine.*

3.4.1 Dosing regulator

- Mount the dosing regulator to the wall.

4. Commissioning

4.1 Preparations for commissioning

4.1.1 Vacuum connections



Warning

**Before connecting, ensure that the valves of all gas containers are closed.
Only use the intended line types!**

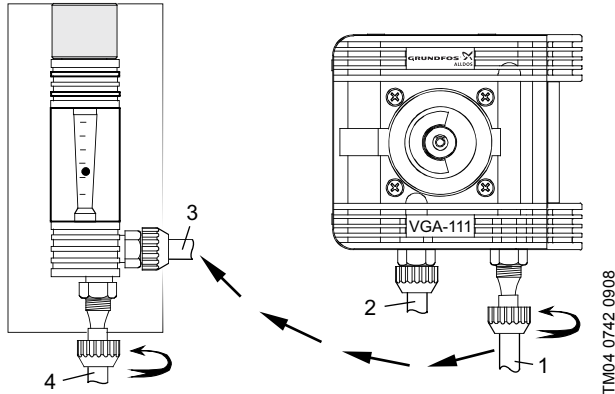


Fig. 4 Vacuum connections

Only tighten the union nuts of the vacuum connections by hand. Do not use any tools!

Caution

Danger of damages!

Maximum length of the vacuum line, see Installation and operating instructions chapter 2, Handling chlorine.

- At the vacuum regulator, connect the vacuum line (1) and connect it to the dosing regulators (3).

Warning



Lead the overpressure line downwards, as chlorine is heavier than air.

**Connect the overpressure line to a suitable adsorption device. If using a gas warning device.
Mount the sensor in a distance of about 10 cm from the outlet hole of the adsorption device.**

- Connect the overpressure line (2).
- Connect the vacuum line to the injector (4).

4.1.2 Electrical connections

Before connecting the mains cable:

Check if the mains voltage indicated on the type plate corresponds to the local mains voltage. Wrong voltage can lead to damages of the product!

Caution

To ensure electromagnetic compatibility (EMC):

Signal lines must be shielded. The shield must be connected to PE or ground on the side of the counterpart, par exemple a controller.

Signal lines and mains lines must be guided in different cable channels.

Dosing regulator VGA-113 with servomotor

Warning



Disconnect from mains before removing the cover!

Observe local safety precautions!

Protect cable connections and plugs against corrosion and moisture.

Close unused screwings with suitable caps!

- Establish the electrical connections according to the following terminal diagrams.
 - with current input 4-20 mA

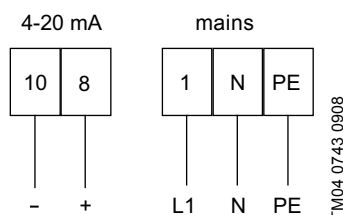


Fig. 5 Terminal connections, current input

- without current input, with feedback potentiometer

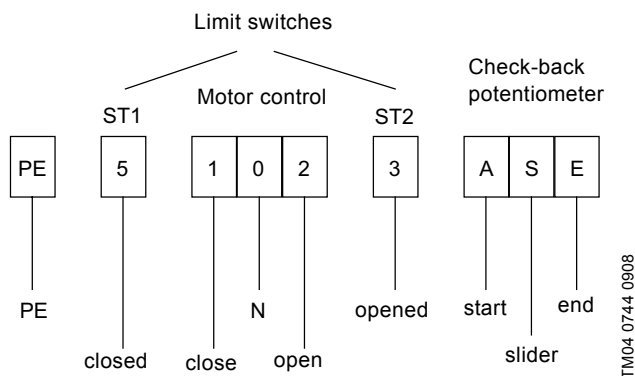


Fig. 6 Terminal connections, with feedback potentiometer



Warning

The terminals 3 and 5 of the limit switches are on mains potential when the switch closes after the limit position had been reached.

4.2 Checks before commissioning

Check tightness of the total plant before start-up



Warning

Check the tightness not until the total plant is ready for start-up.

Danger of gas leakage!

4.2.1 Checking the gas solution lines and the non-return diaphragm of the injector

- Observe the manual of the injector!

4.2.2 Checking the tightness (media Cl₂)



Warning

Liquid ammonia must not come in contact with parts of the plant!

Danger of leakages by corrosion!

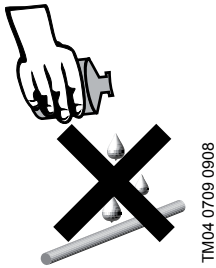


Fig. 7 No liquid ammonia

Checking the pressure connections (after changing gas cylinder)

- Open the cylinder valve and quickly close it again.
- Slowly pass the open ammonia bottle along gas-leading parts.
 - Slightly press the bottle in a pumping manner, allowing the ammonia mist to rise up.
 - Formation of white mist: Leakage at the pressure connection!
- Depressurize the plant!
- Eliminate leakage!
- Check tightness again

Formation of white mist --> pressure connection is not tight

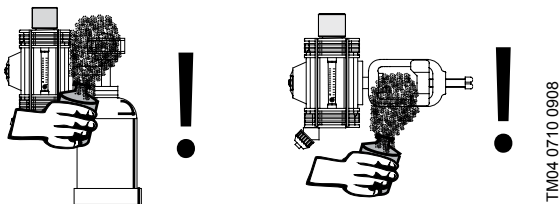


Fig. 8 Ammonia + chlorine gas --> formation of white mist

No formation of white mist --> pressure connection is tight

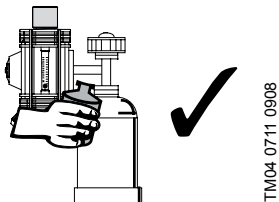


Fig. 9 No chlorine gas --> no formation of white mist

Checking the inlet valve

- Remove the union nut at the overpressure connection and take off the overpressure line.
- Close the rate valve.
- Open the cylinder valve.
- Slowly pass the open ammonia bottle along the overpressure connection.
 - Slightly press the bottle in a pumping manner, allowing the ammonia mist to rise up.
 - Formation of white mist: **The inlet valve is not tight!**
- **Depressurize the plant!**
- **Check the inlet valve and repair it!**
- **Check tightness again**

Formation of white mist --> the inlet valve is not tight!

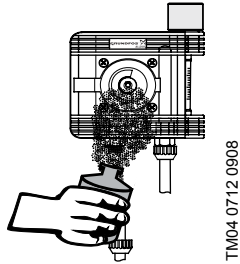


Fig. 10 Ammonia + chlorine gas --> formation of white mist

No formation of white mist --> the inlet valve is tight!

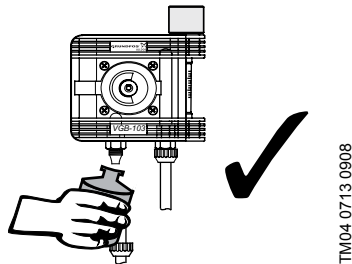


Fig. 11 No chlorine gas --> no formation of white mist

5. Maintenance

Rates for cleaning and maintenance

- at least every 12 months
- in case of malfunction



Warning

Switch off the whole plant before doing cleaning and maintenance work!

Danger of gas break-out!



Warning

Before re-starting, check the tightness!

Danger of gas break-out!

5.1 Possible faults

Fault	Cause	Correction
Gas leakage at the pressure connection.	The gasket at the pressure connection is damaged.	Replace the gasket.
	Sealing surfaces are dirty, there are rests of old gaskets on the sealing surfaces.	Clean the sealing surfaces.
	The sealing surface at the connection of the gas cylinder is damaged.	Use a different gas cylinder.
	The pressure connection is loose.	Tighten the pressure connection.
	The sealing surface at the pressure connection of the device is damaged.	If necessary, replace the inlet valve.
Gas escapes at the overpressure line.	Re-liquefacted gas enters the inlet valve.	Reduce the extraction amount, ensure correct course of temperature.
	The inlet valve is soiled or damaged.	Clean the inlet valve, replace damaged parts.
Formation of ice on the gas cylinder.	The extraction amount per hours is higher than 1% of the contents of the gas cylinder, the system is too small.	Use a dosing system with more than one gas cylinders.
Desired dosing flow is not reached.	Insufficient injector vacuum.	Check the injector, repair it if necessary. Observe the manual of the injector.
		Check the motive water pump, repair it if necessary.
		Check the dirt trap before the injector, clean it if necessary.
	Leakage in vacuum line between dosing unit and injector.	Eliminate the leakage.
	Vacuum line between dosing unit and injector is too long.	Observe table "Suggested line lengths and diameters".
	Vacuum line is dirty.	Replace the vacuum line.
	The valve of the gas cylinder is closed.	Open the valve of the gas cylinder.
	The gas cylinder is empty.	Replace the empty gas cylinder by a new one.
	Filter at the pressure connection of the dosing unit is soiled.	Replace the filter.
Despite correctly displayed gas flow the desired gas solution concentration cannot be reached.	Wrong adjusting spindle (diameter too low).	Mount the correct adjusting spindle.
	Leakage in vacuum line between vacuum regulator and dosing unit.	Eliminate the leakage.
Servomotor does not run.	Servomotor is switched to manual operation.	Switch servomotor to automatic operation.
The ball in the measuring tube is caught.	Measuring tube and/or ball are soiled.	Clean the measuring tube and the ball.
Water in the measuring tube.	Non-return diaphragm of the injector is defective.	Repair the injector. Completely disassemble the dosing unit, clean it and dry it perfectly! Dry the vacuum line to the injector or replace it.
Servomotor does not reach the whole desired range.	The servomotor or the control device is adjusted wrongly.	Adjust the servomotor or check the settings of the control device.
Servomotor runs in wrong direction.		

5.2 Cleaning the measuring tube

5.2.1 Required tools and accessories

- Hot water (ca. 40°C)
- Soft brush
- Screwdriver with wide blade (8-10 mm)

5.2.2 Procedure

- Unscrew the cap.
- Unscrew the screw part.
- Take out the O-rings.
- Take out the measuring tube.
- Take of the plugs of the measuring tube and take out the ball.
- Clean all parts with hot water, use brush if necessary.
- Replace damaged parts, if necessary.
- Dry all parts well.

Caution *Danger of corrosion when mounting moist parts!*

- Remount all parts in reverse sequence.

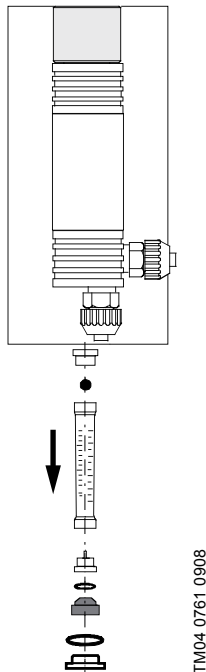


Fig. 12 Cleaning the measuring tube

5.3 Cleaning the Differential Pressure Regulator

5.3.1 Required tools and accessories

- Hot water (ca. 40°C)
- Soft brush
- Crosstip screwdriver
- Special tool 91835362 (48.541)

5.3.2 Procedure

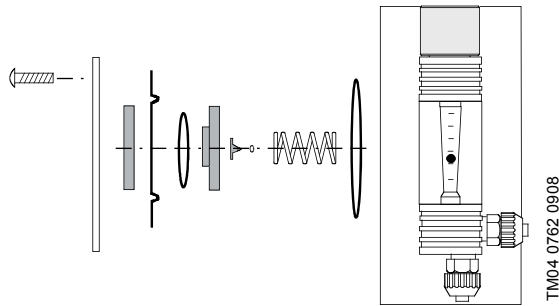


Fig. 13 Schema differential pressure regulator

- Unscrew the back cover and take it off.
- Take out the O-ring, replace it, if necessary.
- Take out the diaphragm disk and unscrew it.
- Clean all parts with hot water, use brush if necessary.
- Dry all parts well.

Caution *Danger of corrosion when mounting moist parts!*

- Remount all parts in reverse sequence.
 - Observe the fitting position of the diaphragm:

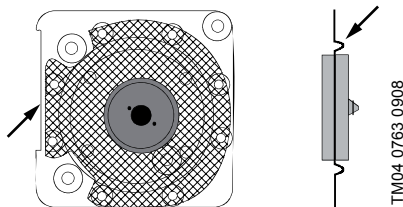


Fig. 14 Fitting position of the diaphragm

5.4 Cleaning the Rate Valve

5.4.1 Required tools and accessories

- Hot water (ca. 40°C)
- Soft brush
- Special tool 48.541
- Cylindrical pin (Ø ca. 6 mm)
- PTFE grease

5.4.2 Procedure

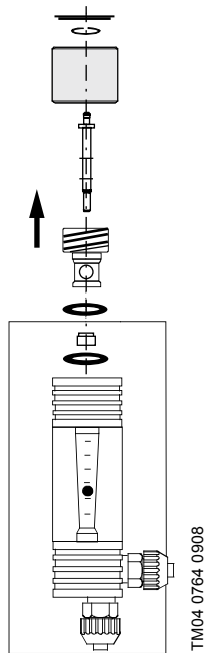


Fig. 15 Schema rate valve

- Unscrew the adjustment knob.
- Unscrew the rate valve cartridge.
- Take out the flat gasket.
- Remove the O-ring of the rate valve cartridge.

Caution *Do not damage the sealing edge of the valve seat!*

- Press out the seat with the cylindrical pin.
- Take off the cap of the adjustment knob.
- Remove the locking ring and take out the spindle.
- Remove the O-rings of the spindle.
- Clean all parts with hot water, use brush if necessary
- Replace damaged parts, if necessary.
- Dry all parts well.

Caution *Danger of corrosion when mounting moist parts!*

- Replace the flat gasket by a new one.

Caution *No grease must get into the longitudinal groove of the spindle!*

- Replace the O-rings of the spindle by new ones, slightly apply Teflon grease to them.
- Replace the O-ring of the rate valve cartridge.
- Remount all parts in reverse sequence.
 - Observe fitting position of the valve seat:

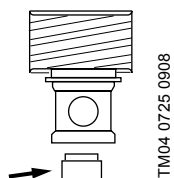


Fig. 16 Observe fitting position of the valve seat

5.5 Adjusting the Servomotor (option)

Note *The servomotor is already adjusted by works.*

In case of repairs or exchange, it may be necessary to readjust the servomotor.

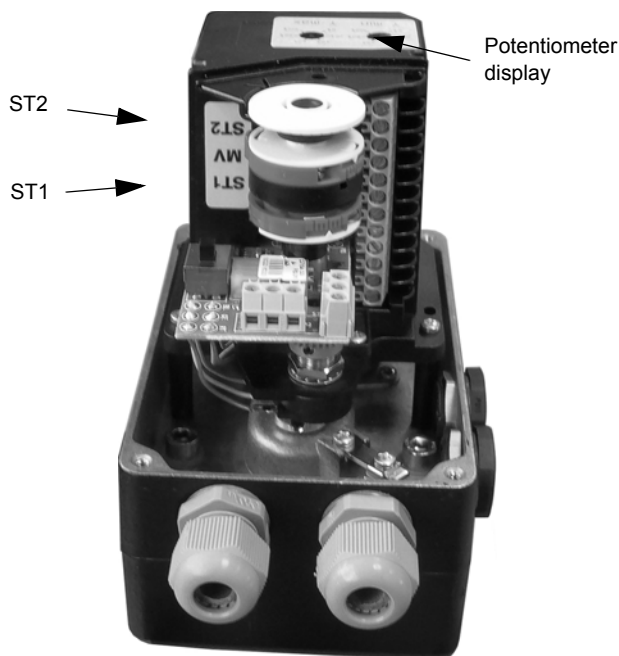


Warning

The servomotor may only be adjusted by qualified personnel, as the mains power has to be switched on.

Danger! Do not touch bare wires or clamp screws!

5.5.1 Servomotor without Current Input



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Fig. 17 Servomotor with limit switch

- Take off the cover of the servomotor.
- With the connected controller, move the servomotor to 0% dosing flow (as indicated at the measuring tube).

Caution *In case of undershoot
The rate valve may get damaged!*

- Adjust this position as zero point of the controller. Adjust lower limit switch (ST1, see fig. 17) to this position of the servomotor.
- Set the controller to 10%.
- Check the dosing flow indicated at the measuring tube. If it is not 10%:
 - Adjust the zero point again. Possibly the ball reaches the end stop at a dosing flow of more than 0%.
- With the connected controller, move the servomotor to 100% dosing flow (as indicated at the measuring tube).

Caution *In case of exceeding
The rate valve may get damaged!*

- Adjust upper limit switch (ST2, see fig. 17) to this position of the servomotor.
- Remount the cover of the servomotor.

5.5.2 Servomotor with Current Input

Note For exact adjustment, a current source 4-20 mA is necessary.

- Take off the cover of the servomotor.
- Connect the current source 4-20 mA to terminals 8 and 10 and set it to 4 mA. If no current source is present: disconnect terminal 8.
- With the potentiometer Ymin, move the servomotor to 0% dosing flow (as indicated at the measuring tube).

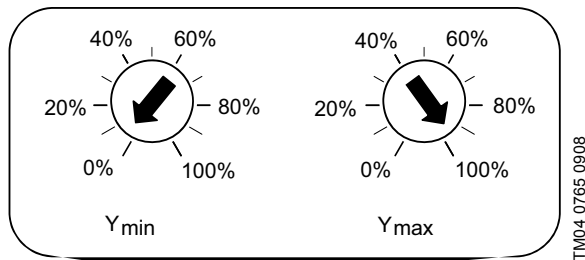


Fig. 18 Potentiometer display for servomotor

Caution In case of undershoot
The rate valve may get damaged!

- Adjust lower limit switch (ST1) to a value just below Ymin.
- Set the current source to 5.6 mA (this corresponds to 10%). This and the following step cannot be done without a current source.
- Check the dosing flow indicated at the measuring tube. If it is not 10%:
 - Adjust the zero point again. Possibly the ball reaches the end stop at a dosing flow of more than 0%.
- Set the current source to 20 mA. If no current source is present: connect terminal 8 to terminal 6.
- With the potentiometer Ymax, move the servomotor to 100% dosing flow (as indicated at the measuring tube).

Caution In case of exceeding
The rate valve may get damaged!

The rate valve may get damaged!

- Adjust upper limit switch (ST2) to a value just above Ymax.
- Remount the cover of the servomotor.

5.5.3 Manual operation of the servomotor

If necessary, the servomotor can also be operated manually.



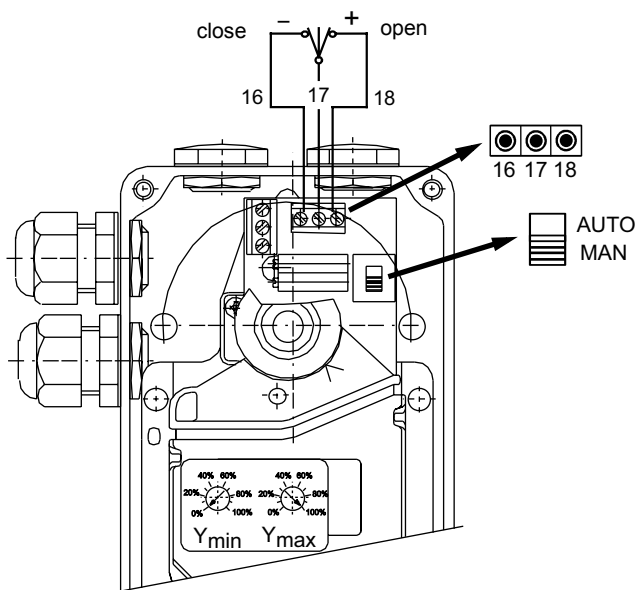
Warning

Danger!

Do not touch bare wires or clamp screws!

- Take off the cover of the servomotor.
- Set the switch to 'manual'.
- Put the servomotor manually into the desired position with an insulated wire jumper, which is temporarily plugged into the terminals 16/17 or 17/18.
 - By bridging of the contacts 16 and 17, the servomotor move to the position 'close'.
 - By bridging of the contacts 17 and 18, the servomotor move to the position 'open'.
- Remount the cover of the servomotor.

(Automatic operation is set by setting the switch to 'automatic'.)

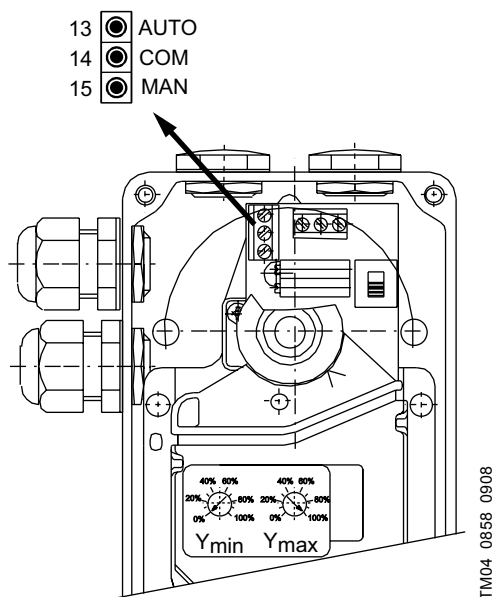


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Fig. 19 Manual operation of the servomotor

5.5.4 Remote indication of the slide switch position

- Remote indication of the manual/automatic slide switch position is possible if required. The tap is made with the terminals 13,14 and 15.



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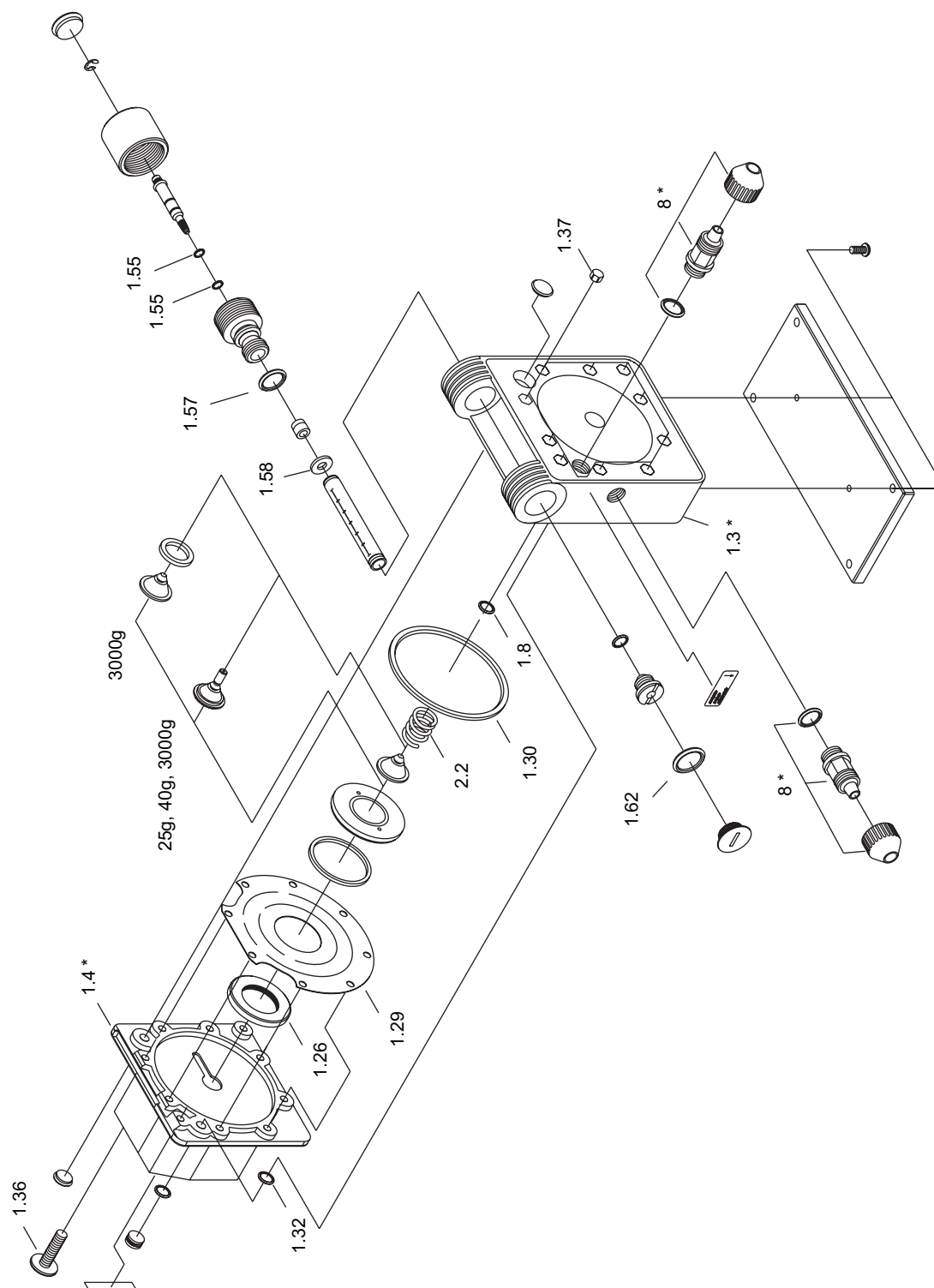
Fig. 20 Remote indication of the slide switch position

Note The terminals 13, 14 and 15 allow remote indication of the slide switch position for AUTO/MAN.

6. Spare Parts

Items without asterisk mentioned in the drawings fig. 21 and 22 are parts of the spare part set. Items with an asterisk have a separate order number.

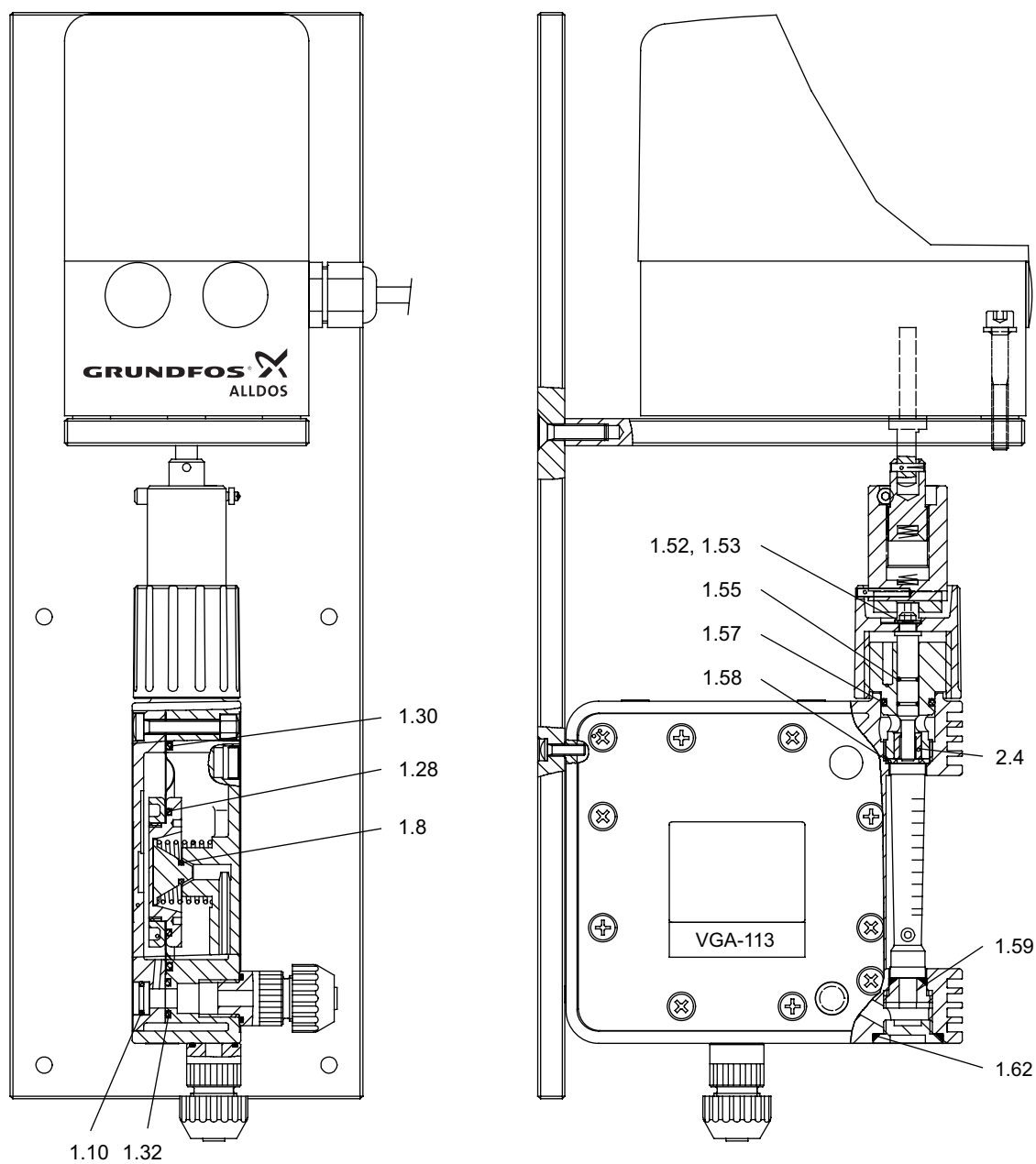
- We suggest to store some spare parts sets to ensure fast replacing of wearing parts, if necessary.



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Fig. 21 Exploded drawing, dosing regulator

Item	Description	Oder no.
All No. without *	Spare part set VGA 113	91835974 (553-602)
8 *	Hose connection	91836568 (12.5364-701)
1.3 *	Body PVC	96680593 (12.2363-104)
1.4 *	Cover PVC	96708275 (12.2366-200)



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Fig. 22 Dosing regulator with servomotor (option)

Item	Description	Order no.
All No.	Spare part set VGA 113	91835974 (553-602)

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.
Boommesteinweg 81-83
B-2630 Aartselaar
Tél.: +32-3-870 7300
Télécopie: +32-3-870 7301

Belorussia

Представительство ГРУНДФОС в Минске
220123, Минск,
ул. Б. Хоружей, 22, оф. 1105
Телефон: (37517) 233-97-65
Факс: (37517) 233-97-69

Bosnia/Herzegovina

GRUNDFOS Sarajevo
Paromlinska br. 16,
BiH-71000 Sarajevo
Phone: +387 33 713290
Telefax: +387 33 231795

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 Jinhu 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 predstavništvo Zagreb
Cebini 37, Buzin
HR-10010 Zagreb
Phone: +385 1 6595 400
Telefax: +385 1 6595 499

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
Mestarintie 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 Törökbálint,
Phone: +36-23 511 110
Telefax: +36-23 511 111

India

GRUNDFOS Pumps India Private Limited
118 Old Mahabalipuram Road
Thoraiakkam
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 iela 80, LV-1035, Rīga,
Tāl.: + 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
Stramsveien 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
Pantelimon 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
Blatnica 1, SI-1236 Trzin
Phone: +386 01 568 0610
Telefax: +386 01 568 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 Fuentevilla, 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
Schönmattdaß 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.: +41-1-806 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.
32 Chaloem 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 Bölgesi
İhsan 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, Буль. 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 Gravely 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

Uzbekistan

Представительство ГРУНДФОС в
Ташкенте
700000 Ташкент ул.Усмана Носира 1-й
тулик 5
Телефон: (3712) 55-68-15
Факс: (3712) 53-36-35

Addresses revised 18.12.2008

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