GF Piping Systems

Tips and Tricks

Diaphragm valves

Contents

1 General information about this document 2

1.1 Diaphragm valves 5 series overview 2
1.2 Construction DIASTAR 4
1.3 Construction Type 604/605 4
1.4 Pressure ranges and spring packages DIASTAR 5

2 Turn the air connections at the DIASTAR 6

3 Changing the diaphragm DIASTAR DN15-DN50 7

3.1 Tool 8
3.2 Instructions for replacing the diaphragm 9

4 Changing the diaphragm DIASTAR DN65-DN150 11

4.1 Replacing the diaphragm 11

5 Accessories 14

5.1 Stroke limiter and manual override 14
5.2 Electrical feedback 14
5.3 Electro-pneumatic positioner - DSR 15
5.4 Pilot valve 15

6 Spare Parts 17

Annex 18

1 General information about this document

This document is valid only as a supplement to the existing GF documentation. The remarks and details in the general user manual are still to be followed.

The following pages should provide support concerning the handling of GF diaphragm valve. Further information can also be found under www.gfps.com/dv or in the GF planning fundamentals industry.

1.1 Diaphragm valves 5 series overview

Manually operated

General	Type	514	515	517	519
					
	Description	True Union	Spigot ends	Flange version	3-Way
	Dimension	DN15-DN50			
	Pressure level	PN10/ PN16 *			
Materials	PVC-U	✓	✓	✓	
	PVC-C	✓	✓	✓	
	ABS	✓	✓		
	PP-H	✓	✓	✓	✓
	PP-n		✓		
	PVDF	✓	✓	✓	✓
	PVDF-HP	✓	✓		✓
Connection type	Sockets	✓			
	Spigot	✓	✓		✓
	Flange			✓	
	Threaded socket	✓			
Diaphragm materials	EPDM	✓	✓	✓	✓
	PTFE/EPDM	✓	✓	✓	✓
	PTFE/FPM	✓	✓	✓	✓
	FPM	✓	✓	✓	
	NBR	✓	✓	✓	
Accessories	Feedback electric	✓	✓	✓	✓

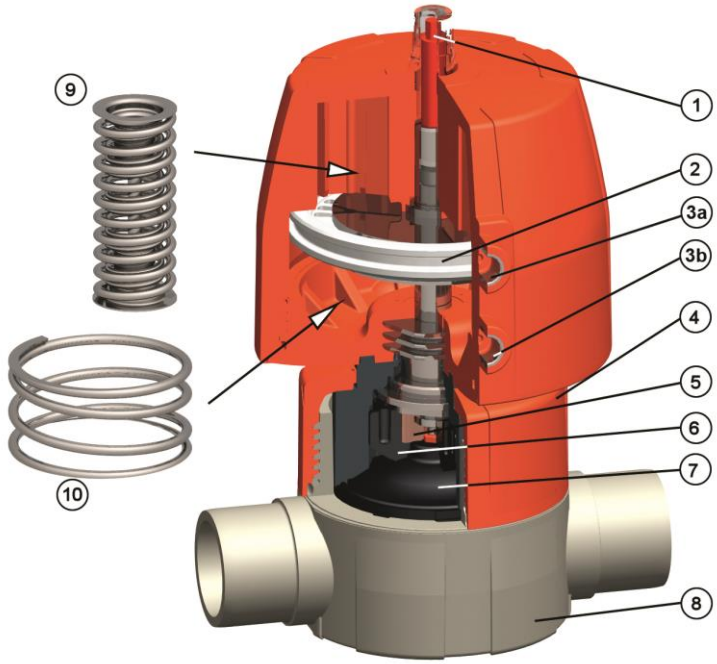
* See pressure-temperature diagram in the respective data sheet

Pneumatically operated

General	Type	604	605	DIASTAR Six	DIASTAR Ten	DIASTAR TenPlus	DIASTAR Sixteen**
							
	Dimension	DN15		DN15-DN50			
	Pressure level	PN6		PN6	PN10	PN10 on both sides	PN16
Functions	FC	✓	✓	✓	✓	✓	✓
	FO	✓	✓		✓	On request	On request
	DA	✓	✓		✓	On request	On request
Spring assemblies	Number	1	1	3-6	3-6	4-6	6
Recommended pressure range*	Bar	0-6	0-6	0-6	0-10	4-10	8-16
Pneumatic connections	Size	G¼“	G¼“	G⅛“	to DN40: G⅛“ from DN40: G¼“	to DN32: G⅛“ from DN32: G¼“	to DN32: G⅛“ from DN32: G¼“
Materials	PVC-U	✓	✓	✓	✓	✓	On request
	PVC-C	✓	✓	✓	✓	✓	
	ABS	On request	On request	✓	✓	✓	
	PP-H	✓	✓	✓	✓	✓	
	PP-n	On request	On request		✓		
	PVDF	✓	✓		✓	✓	✓
	PVDF-HP				✓	✓	✓
Type of valve body	514 (union)	✓		✓	✓	✓	✓
	515 (spigot)		✓	✓	✓	✓	✓
	517 (flange)			On request	✓	✓	✓
	519 (spigot)				✓	✓	✓
Connection type	Sockets	✓		✓	✓	✓	✓
	Spigot	✓	✓	✓	✓	✓	✓
	Flange			On request	✓	✓	✓
	Threaded socket			✓	✓	✓	✓
Diaphragm materials	EPDM	✓	✓	✓	✓	✓	✓
	PTFE/EPDM	✓	✓		✓	✓	✓
	PTFE/FPM	✓	✓		✓	✓	✓
	FPM	✓	✓	On request	On request	On request	On request
	NBR			On request	On request	On request	On request
Accessories	Feedback electric				✓	✓	✓
	Emergency manual override				✓	✓	✓
	Stroke limiter				✓	✓	✓
	Positioner				✓	✓	✓
	Bus connection			On request	✓	✓	✓

* See Chapter 1.4. pressure range and spring assemblies DIASTAR
**Water use only

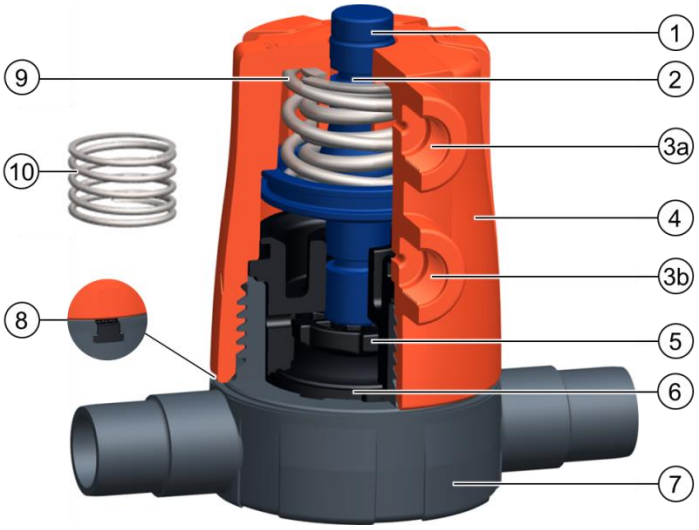
1.2 Construction DIASTAR



No.	Description
1	Optical position indicator with indicator cap
2	Piston
3a	Control air connection FO / DA
3b	Control air connection FC / DA
4	Full plastic housing
5	Diaphragm holder
6	Thrust piece compressor
7	Diaphragm
8	Valve body
9	Pre-loaded spring sets for FC mode
10	Spring for FO mode

Mode of operation, the DA does not use any springs for the control function

1.3 Construction Type 604/605



No.	Description
1	Optical position indicator
2	Piston
3a	Control air connection FO / DA
3b	Control air connection FC / DA
4	Top part with plastic thread
5	Thrust piece compressor
6	Diaphragm
7	Valve body
8	Indicator for diaphragm material
9	Pre-loaded spring sets for FC mode
10	Spring for control function FO

Mode of operation, the DA does not use any springs for the control function

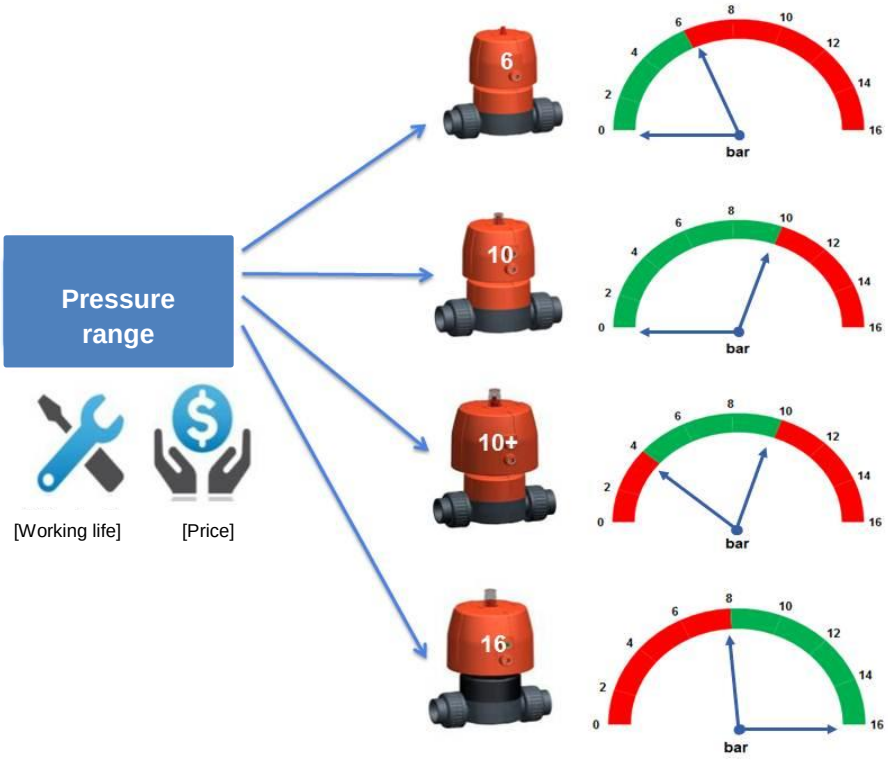
1.4 Pressure ranges and spring packages DIASTAR

The closing force of the actuators were designed for the specified PN pressure level. Operation at very low line pressures and very strong actuators results in increased wear of the diaphragm:

For example: Use DIASTAR Sixteen (FC) only at medium pressures >PN6.

To extend the working life for low line pressures, adjusting the number of spring packages is recommended. For the specific dimensioning, please contact your representative at Georg Fischer Piping Systems.

The following figure shows the recommended media-pressure range depending on the DIASTAR valve:



DANGER

Personal injury or material damage may occur by reducing the spring assemblies!

Reduced spring sets lead to a reduced closing force. At a rising line pressure the valve cannot close or not close properly due to missing spring sets. Death or serious injury could occur due to open piping. The process can be influenced negatively.

Configure diaphragm valve and actuator according to your line pressure.

2 Turn the air connections at the DIASTAR

The connections for the control medium can be positioned in 90° increments, to optimally align it to the piping system.

WARNING

Risk of injury due to uncontrolled evasion of the medium!
If the pressure has not been fully removed, the medium can escape uncontrollably. Depending on the type of medium, risk of injury may exist.

- Completely relieve pressure from the pipeline before changing the position.
- Hazardous to health, flammable or explosive media:

Completely drain and flush piping system and DIASTAR before changing position. Pay attention to possible residues.

- Take the appropriate measures to ensure that the medium is collected safely.

1. Turn screws in threaded inserts and fix valve body in a vice so that the screws come out (see image)

2. FC connection: Pressurise with compressed air.
3. Unscrew the housing nut using a strap wrench or a special tool (cf. section 3.1, Tool).
4. Turn actuator through 90°.

5. Align the diaphragm parallel to the sealing weir Hand-tighten.
6. Tighten the housing nut with the strap wrench or the special tool until the indicator on the housing nut is aligned with the valve body (cf. mark in figure).

3 Changing the diaphragm DIASTAR DN15-DN50

This chapter describes the changing of a diaphragm.

It is possible to change the diaphragm whether the valve is installed or not.

Type and composition of the medium, pressure and temperature can significantly influence the working life of the diaphragm. The inspection intervals are adapted to the particular application requirements.

Maintenance plan

Maintenance interval	Maintenance task
Regularly	Check the connection between top part and valve body for leakage
1 - 2 times a year	Operate to check functionality of permanently open or closed diaphragm valves
100,000 operations with less than 10 bar nominal pressure with 20°C and water DIASTAR Ten/ TenPlus	Perform visual inspection of the valve body Remove the actuator and check diaphragm for damage Change diaphragm in case of damage
50,000 operations with more than 10 bar nominal pressure with 20°C and water DIASTAR Sixteen	Perform visual inspection of the valve body Remove the actuator and check diaphragm for damage Change diaphragm in case of damage

Colour coding of the diaphragm material

The colour of the index plate shows which diaphragm material is installed. The coding is as follows:

Colour of index plate	Diaphragm material
Black	EPDM diaphragm
White	PTFE/ EPDM diaphragm
Green	PTFE/ FPM diaphragm
Red	FPM diaphragm
Blue	NBR diaphragm

3.1 Tool

The following material is required for a change of diaphragm:

- Strap wrench (EasyGrip) or special open-end wrench
- Tip: Use screw clamp and pipe piece for simplified disassembly

3.1.1 Strap wrench EasyGrip

EasyGrip is a strap wrench for pulling and releasing round screw connections. This tool enables the safe screwing of the housing nut and a quick maintenance of all GF diaphragm valves.

EasyGrip can be used for all dimensions of the whole range of the diaphragm valves (DN15-DN50).

No.	198 154 019

3.1.2 Special wrench (GF)

For more frequent maintenance a dimension-dependent special wrench can be used. By using this tool, the maintenance on a diaphragm valve can be carried out efficiently.

The wrench with the following code number can be used for hand and pneumatic valves:

DN	15	29	25	32	40	50
No	198 154 012	198 154 013	198 154 014	198 154 015	198 154 016	198 154 017

Hook wrench

Type	604/605
No.	700 278 354

3.2 Instructions for replacing the diaphragm

Replacing the diaphragm is possible even with valves already installed. A service video is available on http://www.gfps.com/dv.

Preparation

1. Screw two screws into the inserts

Dimension	Screws
DN10-DN25	M6
DN32-DN50	M8

Fix DV

2. Tighten the valve in a vice so that the screws come out. (Image)

Prepare the actuator

3. FC connection: Pressurize with compressed air

   Pulls the diaphragm upwards and eases opening.

   Use of a small ball valve for permanent pressurisation is helpful

Install protection

To prevent damage, use short pipe spigots or similar to protect the position indicator

Place screw clamp

Clamp the DV via the pipe spigots and valvebody. Hand-tighten.

Release actuator

4. Open the valve with the EasyGrip or special wrench counterclockwise, to simplify tighten the vice.

Remove actuator

5. Remove top part with actuator.

Protect position indicator

Use union nut to protect the actuator.

Replace diaphragm

6. Unscrew old diaphragm
7. Screw in the new diaphragm hand-tight.
8. Turn back the diaphragm again at least 90° / maximum 360°
9. Realign the sealing bead of the diaphragm parallel to the sealing weir. In doing this, position the lugs of the diaphragm precisely between the narrow guide groove of the inner housing.

Replace the index plate

10. Change the index plate at the valve body

Screw on the actuator

11. Screw the upper part of the valve back onto the valve body.

    Pay attention to correct position of the sealing bead.

Tighten the actuator

12. Using the EasyGrip or special wrench pull back to the position. (Position indicator of the housing nut aligns with the index plate)

Type 604/605

Use hook key

Pressurise the FC connection with compressed air

For changing the diaphragm, see the description DIASTAR Steps 6-10

Screw the upper part of the valve back onto the valve body. Pay attention to correct position of the sealing bead.

Pull back to the position using the hook key. (Semicircular position indicator of the housing nut aligns with the index plate)

4 Changing the diaphragm DIASTAR DN65-DN150

In the following chapters, replacing the diaphragm, with large DIASTAR dimensions is described.

WARNING

Risk of injury due to uncontrolled evasion of the medium!
If the pressure has not been fully removed, the medium can escape uncontrollably. Depending on the type of medium, risk of injury may exist.

- Completely relieve pressure from the pipeline before changing the position.
- Hazardous to health, flammable or explosive media:

Completely drain and flush piping system and DIASTAR before changing position. Pay attention to possible residues.

- Take the appropriate measures to ensure that the medium is collected safely.

WARNING

Replacement of PTFE diaphragm with backing diaphragm!
Personal injury or material damage through uncontrolled leakage or continued flow from the medium pipe or valve.

- Using PTFE diaphragm with rear position diaphragm EPDM or FPM:
  Make sure that both diaphragms are replaced.

4.1 Replacing the diaphragm

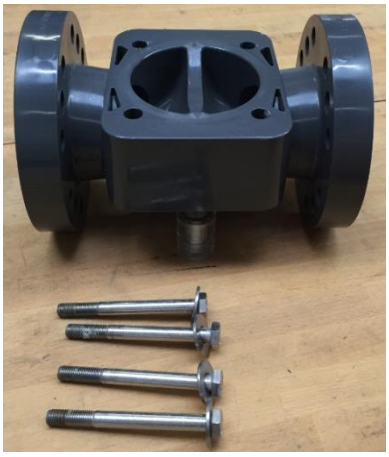
Different connections of diaphragms on the compressor piece; depending on the material and dimension. If the diaphragm material was to be changed, also replace the compressor!

EPDM diaphragm with thread connection

PTFE diaphragm with bayonet connection

FO and DA actuator:
Use compressed air to pressurize the compressor (description see diaphragm replacement)

1. Unscrew the protection cap of the position indicator.



2. Turn around the diaphragm valve and place on a union coupling nut to prevent damage to the position indicator.
3. Unscrew the screws of the valve body.

4. Invert the diaphragm and unscrew it counterclockwise.

5. Install a new diaphragm in the same position as the old diaphragm

- Place the actuator straight up for the first rotations, this is so that the grub screw of the diaphragm holder can grip the diaphragm.
- Install the diaphragm hand tight clockwise.
- Turn back the diaphragm again at least 90° / maximum 360°.
- Realign the sealing bead of the diaphragm parallel to the sealing weir. In doing this, position the butt strap of the diaphragm between the narrow guide groove (recess) of the inner housing.

6. Assemble in reverse order

Torque housing screws:

Dimension	Torque
DN65	25 Nm
DN80	30 Nm
DN100	30 Nm
DN150	40 Nm

5 Accessories

The respective accessories are not suitable for all types manual or pneumatic valves. Examination of the respective specifications is strongly recommended. The information in this document should provide an overview of available accessories and the respective versions.

5.1 Stroke limiter and manual override

The stroke limiter is suitable only for DIASTAR valves and is used for the mechanical flow limitation. In addition, the stroke limiter can be used as an emergency manual override. For information on the respective stroke of the DV, please refer to the Annex.

- For DIASTAR Ten, Ten Plus and Sixteen

Stroke limiter and emergency manual override

5.2 Electrical feedback

The electrical feedback is different for manual and pneumatic diaphragm valves.

For manual diaphragm valves, there are 2 different versions:

- AgNi 250V – 6A
- AU 4 -30 V, 1-100 mA

The following options are available for the DIASTAR valves:

Version	Description
EL position indicator with 2 auxiliary switch Ag Ni	Voltage 250 V ~ 6 A
EL position indicator with 2 auxiliary switch Au	Voltage 4-30 V 1-100 mA
EL position indicator with 2 inductive switch NPN	Voltage 5-30 V (10 - 30 V) = 100 mA
EL position indicator with 2 inductive switch PNP	Voltage 5-30 V (10 - 30 V) = 100 mA
EL position indicator with 2 inductive switch Namur Eexi	Intrinsically safe / voltage 8V =
EL position indicator with 2 inductive switch Eecd	Voltage 250V ~ 5 A
EL position indicator with reed contact	DN15-150 / voltage 250V ~ 200 mA

The stroke limiter / emergency manual override and electronic feedback can be combined. To ensure proper installation with the Diastar valves an appropriate adapter is necessary.

5.3 Electro-pneumatic positioner - DSR

Type DSR 100 – DN15-50

Type DSR 101 – DN65-150

Available also with optical position indicator.

- Installation on pneumatic control valves
- Linear and rotary actuators
- Nominal stroke 3 - 28 mm
- Self-learning
- Input signal 4 - 20 mA
- 24 V DC

Electro-pneumatic positioner - DSR

5.4 Pilot valve

Various pilot valves are available depending on the requirement:

Type	Description
PV 94	3/2-way valve with compressed air connection G1/8 or hose connector (push - in)
PV 95	3/2-way valve with compressed air connection G1/4
PV 2000	3/2-way and 5/2-way valve Connection module AS-interface or Profibus interface
MNL 532	Version for 3/2-way and 5/2-way valves Using a Namur connection plate

Type PV94

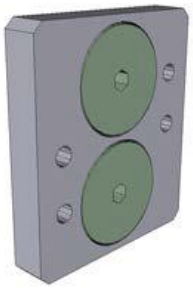
Type PV95

Type PV2000

Type MNL 532

Namur connection plate

If you want to use a NAMUR pilot solenoid valve we offer connection plates. The connection plate is mounted between the actuator and the pilot solenoid valve.



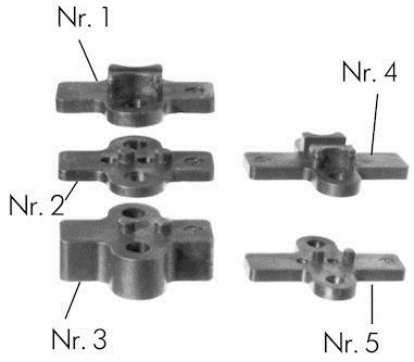
Namur connection plate

Mounting blocks PP

The mounting plates are designed to allow differently sized manual an pneumatic diaphragm valves to be aligned on the same pipe centre line by equalising the different heights from the base to the centre line of the pipe. The mounting blocks can be plugged together to achieve the desired height.

The mounting blocks can be combined as follows:

- DN15-DN25: Mounting block 1 directly on the valve, mounting plate 2 and 3 for additional height equalisation
- DN32-DN50: Mounting block 4 directly on the valve, mounting plate 5 for additional height equalisation



Mounting blocks PP

6 Spare Parts

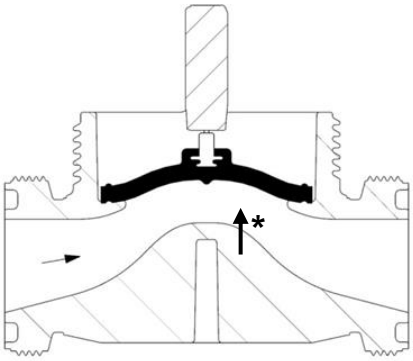
Various spare parts are available for the GF diaphragm valve range of products:

- Upper parts for hand operated valves
- Actuators for pneumatic valves
- Valve bodies
- Sealing kits
- Diaphragm

Other spare parts are available depending on the type and dimension. Please check GF product catalogue for further options.

Annex

Information on the valve stroke



* Maximum valve stroke

DN	Actuator		Valve stroke
	Size	Variant	Target (mm)
15	1	Six, 604/605	6.0
	1	Ten	6.0
			6.0
	2	Sixteen	6.0
20	2	Six	9.0
	2	Ten	9.0
	2	Sixteen	9.0
25	2	Six	12.0
	2	Ten	12.0
	3	Sixteen	12.0
32	3	Six	14.0
	3	Ten	14.0
	4	Sixteen	14.0
40	3	Six	14.0
	4	Ten	14.0
			14.0
	5	Sixteen	14.0
50	3	Six	14.0
			14.0
			14.0
	4	Ten	22.0
	5	Sixteen	22.0

Worldwide at Home

Our sales companies and representatives
ensure local customer support in over 100 countries

www.gfps.com

Argentina / Southern South America
Georg Fischer Central Plastics
Sudamérica S.R.L.
Buenos Aires, Argentina
Phone +54 11 4512 02 90
gfcentral.ps.ar@georgfischer.com
www.gfps.com/ar

Australia
George Fischer Pty Ltd
Riverwood NSW 2210 Australia
Phone +61 (0) 2 9502 8000
australia.ps@georgfischer.com
www.gfps.com/au

Austria
Georg Fischer
Rohrleitungssysteme GmbH
3130 Herzogenburg
Phone +43 (0) 2782 856 43-0
austria.ps@georgfischer.com
www.gfps.com/at

Belgium / Luxembourg
Georg Fischer NV/SA
1070 Bruxelles/Brüssel
Phone +32 (0) 2 556 40 20
be.ps@georgfischer.com
www.gfps.com/be

Brazil
Georg Fischer Sist. de Tub. Ltda.
04571-020 São Paulo/SP
Phone +55 (0)11 5525 1311
br.ps@georgfischer.com
www.gfps.com/br

Canada
Georg Fischer Piping Systems Ltd
Mississauga, ON L5T 2B2
Phone +1 (905) 670 8005
Fax +1 (905) 670 8513
ca.ps@georgfischer.com
www.gfps.com/ca

China
Georg Fischer Piping Systems Ltd
Shanghai 201319
Phone +86 21 3899 3899
china.ps@georgfischer.com
www.gfps.com/cn

Denmark / Iceland
Georg Fischer A/S
2630 Taastrup
Phone +45 (0) 70 22 19 75
info.dk.ps@georgfischer.com
www.gfps.com/dk

Finland
Georg Fischer AB
01510 VANTAA
Phone +358 (0) 9 586 58 25
Fax +358 (0) 9 586 58 29
info.fi.ps@georgfischer.com
www.gfps.com/fi

France
Georg Fischer SAS
95932 Roissy Charles de Gaulle
Cedex
Phone +33 (0) 1 41 84 68 84
fr.ps@georgfischer.com
www.gfps.com/fr

Germany
Georg Fischer GmbH
73095 Albershausen
Phone +49 (0) 7161 302-0
info.de.ps@georgfischer.com
www.gfps.com/de

India
Georg Fischer Piping Systems Ltd
400 083 Mumbai
Phone +91 224007 2001
branchoffice@georgfischer.com
www.gfps.com/in

Indonesia
George Fischer Pte Ltd –
Representative Office
Phone +62 21 2900 8564
Fax +62 21 2900 8566
sgp.ps@georgfischer.com
www.gfps.com/sg

Italy
Georg Fischer S.p.A.
20063 Cernusco S/N (MI)
Phone +39 02 921 861
it.ps@georgfischer.com
www.gfps.com/it

Japan
Georg Fischer Ltd
556-0011 Osaka,
Phone +81 (0) 6 6635 2691
jp.ps@georgfischer.com
www.gfps.com/jp

Korea
GF Piping Systems
Georg Fischer Korea Co., Ltd.
Unit 2501, U-Tower
120 HeungdeokJungang-ro
(Yeongdeok-dong)
Giheung-gu, Yongin-si, Gyeonggi-do,
Korea
Phone: +82 31 8017 1450
Fax : +82 31 217 1454
kor.ps@georgfischer.com
www.gfps.com/kr

Malaysia
George Fischer (M) Sdn. Bhd.
40460 Shah Alam, Selangor Darul
Ehsan
Phone +60 (0) 3 5122 5585
Fax +603 5122 5575
my.ps@georgfischer.com
www.gfps.com/my

Mexico / Northern Latin America
Georg Fischer S.A. de C.V.
Apodaca, Nuevo Leon
CP66636 Mexico
Phone +52 (81) 1340 8586
Fax +52 (81) 1522 8906
mx.ps@georgfischer.com
www.gfps.com/mx

Middle East
Georg Fischer
Piping Systems (Switzerland) Ltd
Dubai, United Arab Emirates
Phone +971 4 289 49 60
gcc.ps@georgfischer.com
www.gfps.com/int

Netherlands
Georg Fischer N.V.
8161 PA Epe
Phone +31 (0) 578 678 222
nl.ps@georgfischer.com
www.gfps.com/nl

Norway
Georg Fischer AS
1351 Rud
Phone +47 67 18 29 00
no.ps@georgfischer.com
www.gfps.com/no

Philippines
George Fischer Pte Ltd
Representative Office
Phone +632 571 2365
Fax +632 571 2368
sgp.ps@georgfischer.com
www.gfps.com/sg

Poland
Georg Fischer Sp. z o.o.
05-090 Sekocin Nowy
Phone +48 (0) 22 31 31 0 50
poland.ps@georgfischer.com
www.gfps.com/pl

Romania
Georg Fischer
Piping Systems (Switzerland) Ltd
020257 Bucharest - Sector 2
Phone +40 (0) 21 230 53 80
ro.ps@georgfischer.com
www.gfps.com/int

Russia
Georg Fischer
Piping Systems (Switzerland) Ltd
Moscow 125040
Phone +7 495 748 11 44
ru.ps@georgfischer.com
www.gfps.com/ru

Singapore
George Fischer Pte Ltd
11 Tampines Street 92, #04-01/07
528 872 Singapore
Phone +65 6747 0611
Fax +65 6747 0577
sgp.ps@georgfischer.com
www.gfps.com/sg

Spain / Portugal
Georg Fischer S.A.
28046 Madrid
Phone +34 (0) 91 781 98 90
es.ps@georgfischer.com
www.gfps.com/es

Sweden
Georg Fischer AB
117 43 Stockholm
Phone +46 (0) 8 506 775 00
info.se.ps@georgfischer.com
www.gfps.com/se

Switzerland
Georg Fischer
Rohrleitungssysteme (Schweiz) AG
8201 Schaffhausen
Phone +41 (0) 52 631 30 26
ch.ps@georgfischer.com
www.gfps.com/ch

Taiwan
Georg Fischer Co., Ltd
San Chung Dist., New Taipei City
Phone +886 2 8512 2822
Fax +886 2 8512 2823
www.gfps.com/tw

United Kingdom / Ireland
George Fischer Sales Limited
Coventry, CV2 2ST
Phone +44 (0) 2476 535 535
uk.ps@georgfischer.com
www.gfps.com/uk

USA / Caribbean
Georg Fischer LLC
9271 Jeronimo Road
92618 Irvine, CA
Phone +1 714 731 88 00
Fax +1 714 731 62 01
us.ps@georgfischer.com
www.gfps.com/us

International
Georg Fischer
Piping Systems (Switzerland) Ltd
8201 Schaffhausen/Switzerland
Phone +41 (0) 52 631 30 03
Fax +41 (0) 52 631 28 93
info.export@georgfischer.com
www.gfps.com/int

GFDO_6458_4 (08.16)