Supplement to the Installation - and Maintenance manual

COBRA Vacuum Pump with Magnetic Coupling

Screw Vacuum Pumps

COBRA NC 400 B

CE

Ateliers Busch S.A.
Zone industrielle
2906 Chevenez
Switzerland

0870549497 / 081209 / Original instructions / Modifications reserved

Table of Contents

This complement contains further instructions concerning the installation and operation of the COBRA vacuum pump equipped with magnetic coupling.

Introduction

Congratulations on the purchase of your Busch vacuum pump. Whilst always responding to customers' requirements and through constant innovation and improvements, Busch delivers modern vacuum and pressure solutions at the head of Industry worldwide.

This complement to the Roots Installation and Operating Instructions contains information on

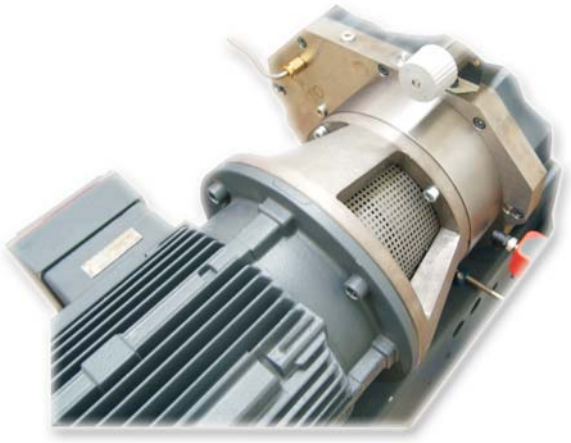
- product description
- safety
- installation
- maintenance
- overhaul
- dismantling

of the vacuum pump with magnetic coupling.

In these instructions, the "handling " of the vacuum pump implies the transport, storage, installation, commissioning, influences on operating conditions, maintenance, troubleshooting and overhaul of the vacuum pump.

Prior to handling the vacuum pump, these operating instructions must be read and understood. If you have any doubts, please contact your Busch representative.

Keep these operating instructions and, if applicable, other relevant operating instructions available and accessible on site.



Product description

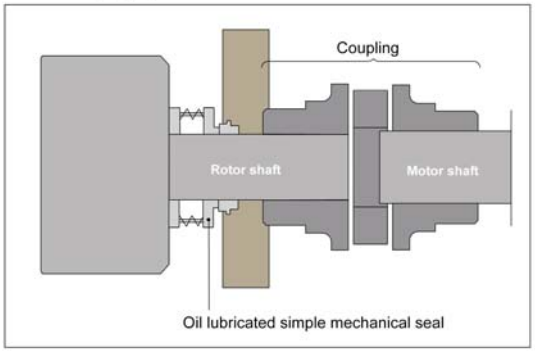
NC 400 B

Operating principle

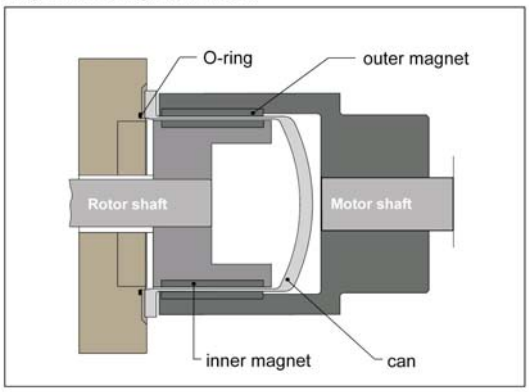
The COBRA NC 400 B vacuum pumps with magnetic coupling work according to the tried and tested screw vacuum pump.
The operation of the magnetic coupling pump is identical to that of the standard coupling.

The use of a magnetic coupling allows to suppress the radial shaft seals and their lubrication system.

Standard coupling=dynamical seal



Magnetic coupling=statical seal



The starting torque of the drive motor must not exceed the nominal torque of the magnetic coupling. This means:

– 145 Nm for COBRA NC 400 B

ATTENTION

The motor start-up is done using a converter which allows a progressive start-up for about 30 seconds and helps to limit any risks of possible overheating of the magnetic coupling.

CAUTION

The magnetic coupling has been designed for use under normal operating conditions.
When running under extreme conditions, the magnetic coupling can overheat leading to the destruction of the coupling bell and thus the loss of leak tightness of the pump, as the coupling bell also ensures that the pump is leak tight.

Safety

Intended use

DEFINITION : To rule out any misunderstanding, the term " handling " of the vacuum pump implies transport, storage, installation and commissioning of the pump as well as influences on operating conditions, maintenance, troubleshooting and overhaul of the vacuum pump.

The vacuum pump is intended for industrial use. It may only be operated by qualified personnel.

The need for personal safety regulations depends mainly on the application the pump will be used in. The end user must provide the operators with the necessary means and must inform his personnel about any dangers coming from the processed product.

The end user of the vacuum pump must observe the safety regulations and must train and instruct his personnel accordingly.

The maintenance instructions must be followed.

These Installation and Maintenance Instructions as well as the standard Roots pump manual must be read and understood before handling the vacuum pump. If in any doubts, please contact your Busch representative.

Safety information

The vacuum pump has been designed and manufactured in accordance with the latest technical standards and safety regulations. However, whilst handling the vacuum pump, residual risks do remain.

Various safety instructions can be found in this handbook as well as on the pump. These safety instructions must be followed. Safety instructions can be detected through one of the following keywords DANGER, WARNING and CAUTION as follows :

WARNING

Strong magnetic field:
“ Persons wearing a pacemaker must keep outside the area of influence of the magnetic field ” !

Danger to life

Disregard of this safety instruction will always lead to accidents with potentially fatal injuries or serious damage.

DANGER

Danger of damage to the pump or system

Disregard of this safety instruction will always lead to accidents with potentially fatal injuries or serious damage.

WARNING

Danger of personal injury

Disregard of this safety instruction will always lead to accidents with potentially fatal injuries or serious damage.

CAUTION

Disregard of this safety instruction may lead to accidents with minor injuries or damage to property.

Use in explosive atmosphere

Use of the magnetic coupling on ATEX category 3 Gi/o certified pump

It is recommended to use a progressive start-up for the vacuum pump using a frequency inverter.

The temperature class of the coupling under normal operating conditions corresponds to the internal and external temperature classes of the vacuum pump.

CAUTION

In case of slippage, the coupling will heat up and thus exceed the temperature class.

The slippage of the coupling can be monitored by the current consumption of the motor : should it drop by more than 20% in relation to the minimum current consumption of the motor under normal operating conditions, the pump must be stopped and removed from the power supply.

Use of the magnetic coupling on ATEX category 2 Gi/o certified pump

It is recommended to use a progressive start-up for the vacuum pump using a frequency inverter.

CAUTION

For certified category 2G i/o pumps, the temperature class must be watched by measuring the surface temperature of the ceramic bell using a PT100 temperature sensor installed on the pump.

WARNING

Minimum obligatory monitoring of the coupling for pumps with certification

II 2G (i/o) IIB T3 (i/o)

Temperature of the magnetic coupling bell with the temperature sensor TSA+/0106

The vacuum pump must immediately be stopped when one of the monitoring instruments exceeds the value defined in the “COBRA ATEX Catalogue”.

It is the customer’s responsibility to operate his vacuum pump in accordance with all security measures linked to the protection against explosions.

DANGER

Any servicing on the pump must only be carried out by specially trained servicing staff under strict adherence to current and valid safety regulations. In case of possible risk from dangerous substances of any kind, the end user of the pump must duly inform and instruct maintenance staff before any work is carried out.

Before any maintenance work is carried out, any risk to the health of maintenance staff that could come from drawn substances or any other substance both within or outside the pump, must be excluded.

Installation and commissioning

Installation Prerequisites

- Make sure that the integration of the vacuum pump complies with the safety requirements of the Machine Directive 2006/42/EC (concerning the responsibility of the manufacturer of the machine or installation into which the vacuum pump is to be incorporated; please also refer to the note in the EC-Declaration of Conformity).

Fitting

- Make sure that the “Installation Prerequisites ” are followed.
- Set up or mount the vacuum pump at its location

Maintenance

CAUTION

Any dismantling of the vacuum pump that is beyond the scope of what is described in this manual must be done by specially trained Busch service personnel only.

CAUTION

During operation the surface of the vacuum pump can exceed temperatures of 90°C.

Risk of burns!

Before starting maintenance work, make sure that the vacuum pump has been fully switched off and that it cannot accidentally be switched on again. Follow the procedure for stopping the pump in section " Stopping procedure for maintenance " :

- Switch off the vacuum pump
- Switch off the main power supply
- Put up the warning sign " Maintenance in progress " on or next to the pump

CAUTION

During operation the oil temperature of the vacuum pump can reach a value of 120°C !

Risk of burns !

After the completion of all maintenance work, follow the procedure "Start-up procedure after maintenance" " :

- Remove the sign " Maintenance in progress "
- Check the oil levels, top up with oil if necessary, switch on the main supply
- Make sure that the "Installation Prerequisites" are complied with
- Switch on the vacuum pump

Maintenance Precautions

CAUTION

The following safety instructions are only relevant when dismantling the magnetic drive system.

DANGER

Keep people wearing a pacemaker away from the influence of the magnetic field!

Danger to life

DANGER

Label any room, where assembly or dismantling work on the magnetic coupling system is carried out or where parts of the magnetic coupling system are stored, with the danger sign :
" No trespassing for persons with pacemaker "

- Do not place the dismantled magnetic coupling into the vicinity of computers, data carriers and other electronic components.
- Keep all magnetizable parts away from the magnetic coupling.

CAUTION

The powerful magnetic field can influence the functioning and operational safety of electrical and electronical units.

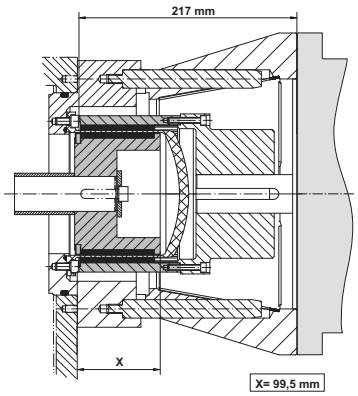
CAUTION

Improper or incorrect maintenance work on the vacuum pump will put the safety of operation at risk.

Risk of explosion !

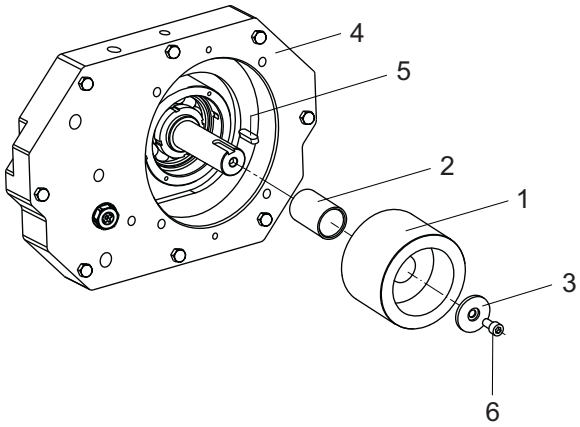
It is strongly advised that any dismantling of the vacuum pump that goes beyond the scope of what is described in this manual should be done by specially trained Busch service staff only.

Fitting the magnetic coupling



Step 1

- Carry out an inspection by measuring the length of the spacer (2). This measurement must be 31,5 mm.
- Fit the spacer (2), and position the shaft key (5) as well as the inner part of the magnetic coupling (1) onto the rotor shaft.
- Measure the distance between the face of the magnetic coupling's inner rotor (1) and the supporting face of the cover (4). This value (x) must be 99,5 mm.
- Use the washer (3) and the screw (6) to fix axially.



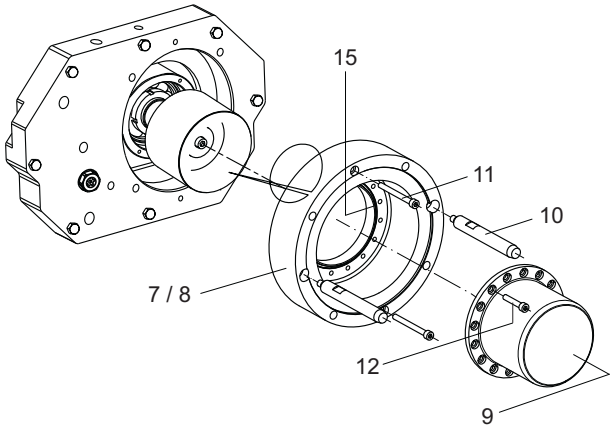
Step 2

- Fit the adapter flange (7) with its o-ring (8) into the housing (4) using the two fixing screws (11)
- Screw and glue the two guiding rods (10) onto the adapter flange (7).
- Fit the ceramic bell housing (9) of the coupling with its o-ring (15) onto the adapter flange (7).

CAUTION

Please handle the ceramic bell housing carefully to prevent damaging it.

– Tighten up and glue the fixing screws (12) to a maximum torque of 6 Nm.

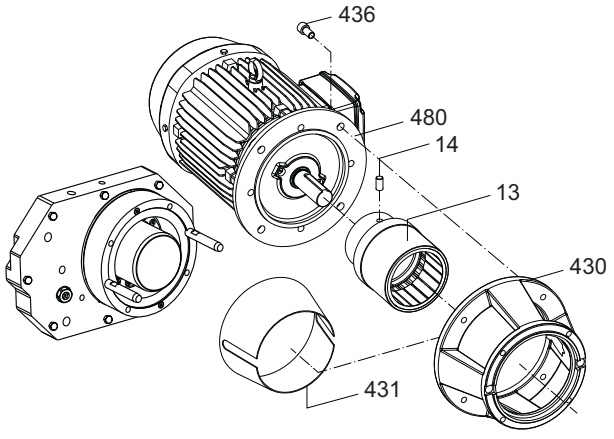


Step 3

– Fit the coupling (13) onto the motor shaft (480).

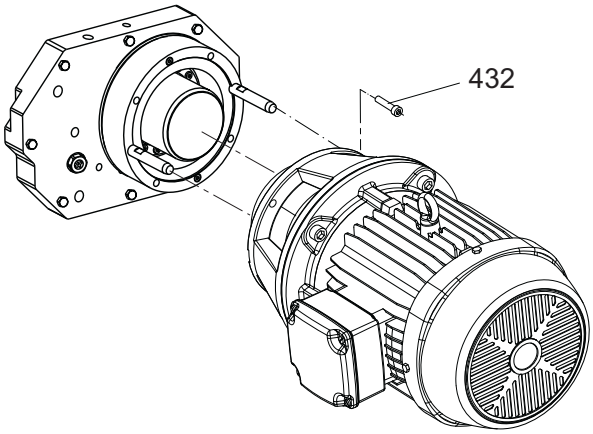
Note: The coupling (13) can come in 2 parts: the exterior rotor of the coupling and flange hub. Those parts are fitted and glued using 4 M6 screws, then tightened to a torque of 10Nm.

– Measure and adjust the distance between the coupling face (13) and the motor flange (480). This value must be 217 mm. Lock with the fixing screw (14).
– Fit the protection grid (431) into the motor lantern.
– Mount the motor lantern (430) onto the motor (480). Tighten with the screw (436).



Step 4

– Carefully fit the motor/ lantern/ exterior rotor unit onto the pump. The two guiding rods will compensate the radial forces coming from the magnets. Make sure to keep good control over the axial forces ! (Risk of squashed fingers!)
– Tighten the screws (432).



Dismantling the motor/ the lanterne/ the exterior coupling

CAUTION

Always make sure that the vacuum pump is disconnected from the power supply when carrying out any work on the pump.

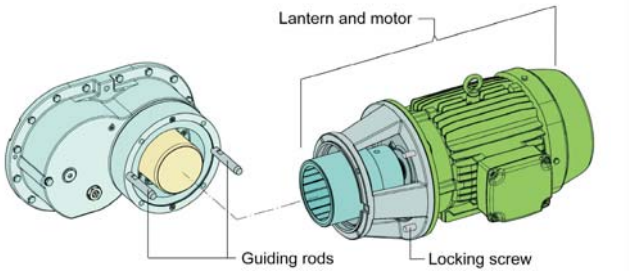
If necessary, remove the vacuum pump from the system to carry out any work.

DANGER

Danger of personal injury whilst dismantling/assembling the components.

When dismantling the Roots pump (replacing internal components), separate the motor/ lantern unit from the pump body.

The motor, the lantern and the exterior coupling must not be separated during dismantling.



To do this, follow the following instructions:

– Unscrew the bolts pins from the motor/lantern unit
– Remove the motor/lantern unit with the help of the guiding rods.The access to the internal components is now given.

CAUTION

Do not damage the magnetic coupling and any of the other components which do not need to be changed.

CAUTION

All maintenance work on or around the magnetic coupling must be carried out under strict adherence to safety standards.

The same applies to all dismantling work on other parts of the vacuum pump.

Fitting the motor/ the lanterne/ the exterior coupling

When fitting the motor/lantern unit onto the pump, carefully fit the components with the help of the two guiding rods. These help to compensate radial forces.
CAUTION : While mounting this unit, control the axial force. Risk of squashing fingers due to the effect of magnetism.

Inactivity of the vacuum pump for longer periods of time

If the pump is to be switched off for a long period of time, precautionary measures of protection against corrosion must be carried out.

CAUTION

Label rooms where pumps equipped with magnetic couplings are stored with the danger sign : " No trespassing for persons with pacemaker " !

Note

EC-Declaration of Conformity

NOTE: This EC Declaration of Conformity and the CE-marking on the nameplate are valid for the vacuum pump within the Busch scope of delivery. When this vacuum pump is integrated into a larger machinery or system, the manufacturer of the larger machinery or system (this can also be the end user) must conduct the conformity assessment procedure in accordance with the Machinery Directive 2006/42/EC for the larger machine or system, issue the Declaration of Conformity for it and affix the corresponding CE marking.

We

Ateliers Busch S.A.
Zone Industrielle
2906 Chevenez
Switzerland

represented in the European Union by

Dr.-Ing. K. Busch GmbH
Schauinslandstr. 1
79689 Maulburg
Germany

hereby declare that the vacuum pumps **NC 400 B**

in accordance with the European Directives

"Machinery" 2006/42/EC,

"Electrical Equipment Designed for Use within Certain Voltage Limits" (so called "Low Voltage") 2006/95/EC,

"Electromagnetic Compatibility" 2004/108/EC

have been designed and manufactured to the following specifications:

Standard	Title of the Standard
Harmonised Standards	
EN ISO 12100-1 EN ISO 12100-2	Safety of machinery - Basic concepts, general principles of design - Part 1 and 2
EN ISO 13857	Safety of machinery - Safety distances to prevent hazard zones being reached by upper and lower limbs
EN 1012-1 EN 1012-2	Compressors and vacuum pumps - Safety requirements - Part 1 and 2
EN 60204-1	Safety of machinery - Electrical equipment of machines - Part 1: General requirements
EN 61000-6-1 EN 61000-6-2	Electromagnetic compatibility (EMC) - Generic immunity standards; part 1 and 2
EN 61000-6-3 EN 61000-6-4	Electromagnetic compatibility (EMC) - Generic emission standards; part 1 and 2
National Standard	
EN ISO 2151	Acoustics - Noise test code for compressors and vacuum pumps - Engineering method (grade 2)

	Manufacturer	Representative in the EU
	Werner Kervarec General Director	**Dr.-Ing. Karl Busch** General Director

Note

Note

Busch – All over the World in Industry www.busch-vacuum.com

Australia
Busch Australia Pty. Ltd.
30 Lakeside Drive
Broadmeadows, Vic. 3047
Tel: (03) 93 55 06 00
Fax: (03) 93 55 06 99

Austria
Busch Austria GmbH
Industriepark Nord
2100 Korneuburg
Tel: 02262 / 756 65-0
Fax: 02262 / 756 65-20

Belgium
Busch N.V./Busch SA
Kruinstraat 7
9160 Lokeren
Tel: (0)9 / 348 47 22
Fax: (0)9 / 348 65 35

Brazil
Busch do Brasil Ltda.
Rod. Edgard Máximo Zambotto, Km 64
13240-000 Jarinu-SP
Tel: (55) 11-4016 1400/5277
Fax: (55) 11-4016 5399

Canada
Busch Vacuum Technics Inc.
1740, Boulevard Lionel Bertrand
Boisbriand (Montréal)
Québec J7H 1N7
Tel: 450 435 6899
Fax: 450 430 5132

Chile
Busch Chile S. A.
Calle El Roble N° 375-G
Lampa - Santiago
Tel: (56-2) 7387092
Fax: (56-2) 7387092

China
Busch Vacuum (Shanghai) Co., Ltd
No.5, Lane 195 Xipu Road
Songjiang Industrial Estate East New Zone
Shanghai 201611 PRC
Tel: +86 (0)21 67600800
Fax: +86 (0)21 67600700

Czech Republic
Busch Vakuum s.r.o.
Pražákova 10
619 00 Horní Heršpice
Brno
Tel: +420 543 42 48 55
Fax: +420 543 42 48 56

Denmark
Busch Vakuumteknik A/S
Parallelvej 11
8680 Ry
Tel: +45 87 88 07 77
Fax: +45 87 88 07 88

Finland
Busch Vakuumteknik Oy
Sinikellontie 4
01300 VANTAA
Tel: 09 774 60 60
Fax: 09 774 60 666

France
Busch France S.A.
Parc Technologique
de Bois Chaland CE 2922
91029 Evry Cedex
Tel: 01 69 89 89 89
Fax: 01 60 86 16 74

Germany
Dr.-Ing. K. Busch GmbH
Schauinslandstr. 1
79689 Maulburg
Tel: (0 76 22) 6 81-0
Fax: (0 76 22) 6 81-194
e-mail: info@busch.de

Dr.-Ing. K. Busch GmbH
Niederlassung Nord
Ernst-Abbe-Str. 1-3
25451 Quickborn
Tel: (0 41 06) 7 99 67-0
Fax: (0 41 06) 7 99 67-77

Dr.-Ing. K. Busch GmbH
Niederlassung West
Nordring 35
64807 Dieburg
Tel: (0 60 71) 92 82-0
Fax: (0 60 71) 14 71

Dr.-Ing. K. Busch GmbH
Außenstelle Neuenrade
Breslauer Str. 36
58809 Neuenrade
Tel: (0 23 92) 50 29 92
Fax: (0 23 92) 50 72 11

Dr.-Ing. K. Busch GmbH
Niederlassung Süd-Ost
Gewerbestraße 3
90579 Langenzenn
Tel: (09 01) 90 25-0
Fax: (09 01) 90 25-25

Dr.-Ing. K. Busch GmbH
Außenstelle Zella-Mehlis
Am Rain 11
98544 Zella-Mehlis
Tel: (0 36 82) 46 92 71
Fax: (0 36 82) 46 92 73

Dr.-Ing. K. Busch GmbH
Außenstelle Meitingen-Ostendorf
Grüntenweg 8
86405 Meitingen-Ostendorf
Tel: (0 82 71) 426-341
Fax: (0 82 71) 426-342

India
Busch Vacuum India Pvt Ltd.
Plot No. 110, Sector 7
PCNTDA, Bhosari
Pune 411026, Maharashtra
Tel: (0)206410 2886
Fax: (0)202711 2838

Ireland
Busch Ireland Ltd.
A10-11 Howth Junction Business Centre
Kilbarrack, Dublin 5
Tel: 00353 1 832 1466
Fax: 00353 1 832 1470

Israel
Busch Israel Ltd.
1 Mevo Sivan Street
Qiryat Gat 82022, Israel
Tel: +972 (0)8 6810485
Fax +972 (0)8 6810486

Italy
Busch Italia S.r.l.
Via Ettore Majorana, 16
20054 Nova Milanese
Tel: 0362 370 91
Fax: 0362 370 999

Japan
Nippon Busch K.K.
1-23-33, Megumigaoka
Hiratsuka City, Kanagawa
Japan 259-1220
Tel: 0463-50-4000
Fax: 0463-50-4004

Korea
Busch Korea Ltd.
392-1 Yangji-Ri, Yangji-Myun,
Yongin-si, Kyunggi-Do
Tel: 031) 321-8114
Fax: 031) 321 4330

Malaysia
Busch (Malaysia) Sdn Bhd.
6 Jalan Taboh 33/22
Shah Alam Technology Park
Section 33
40400 Shah Alam
Selangor D. E.
Tel: 03 5122 2128
Fax 03 5122 2108

Mexico
Busch Vacuum Mexico S de RL de CV
Tlaquepaque 4865, Los Altos
Monterrey, Nuevo Leon
Mexico 64370
Tel: (81) 8311-1385
Fax: (81) 8311-1386

Netherlands
Busch B.V.
Pompmolenlaan 2
3447 GK Woerden
Postbus 2091
3440 DB Woerden
Tel: (0)348 - 462300
Fax: (0)348 - 422939

New Zealand
Busch New Zealand Ltd.
Unit D, 41 Arrenway Drive
Albany 0632
Auckland
Tel: 09 414 7782
Fax: 09 414 7783

Norway
Busch Vakuumteknikk AS
Hestehagen 2
1440 Drøbak
Tel: 64 98 98 50
Fax: 64 93 66 21

Poland
Busch Polska Sp. z o.o.
Ul. Chopina 27
87800 Włocławek
Tel: (054) 2315400
Fax: (054) 2327076

Portugal
Busch Ibérica S.A., Sucursal em Portugal
Zona Industrial Raso de Travassô, Fracção B, Armazém 2
3750-753 Agueda
Aveiro, Portugal
Tel: +351 234 648 070
Fax: +351 234 648 068

Singapore
Busch Vacuum Singapore Pte Ltd
20 Shaw Road
#01-03 Ching Shine Building
Singapore 36 79 56
Tel: (65) 6488 0866
Fax: (65) 6288 0877

Spain
Busch Ibérica S.A.
C/ Jaume Ferran, 6-8
Pol. Ind. Coll de la Manya
08403 Granollers
Tel: +34 93 861 61 60
Fax: +34 93 840 91 56

Sweden
Busch Vakuumteknik AB
Bråta Industriområde
435 33 Mölnlycke
Tel: 031 - 338 00 80
Fax: 031 - 338 00 89

Switzerland
Busch AG
Waldweg 22
4312 Magden
Tel: 061 / 845 90 90
Fax: 061 / 845 90 99

Taiwan
Busch Taiwan Corporation
1F. No. 69, Sec. 3, Beishen Rd.
Shenkeng Township,
Taipei Country,
Taiwan (222), R.O.C
Tel: (02) 2662 0775
Fax: (02) 2662 0796

Thailand
Busch Vacuum (Thailand) Co., Ltd.
888/30 Moo19, Soi Yingcharoen, Bangplee-Tamru Rd.,
Bangpleeyai, Bangplee, Samutprakarn 10540 Thailand
Tel: (66) 2-382-5428
Fax: (66) 2-382-5429

Turkey
VAKUTEK
Emlak Kredi Ishani No: 179
81130 Üsküdar-Istanbul
Tel: (216) 310 0573
Fax: (216) 343 5126

United Kingdom
Busch (UK) Ltd
Hortonwood 30-35
Telford Shropshire TF1 7YB
Tel: 01952 677 432
Fax: 01952 677 423

USA
Busch, Inc.
516-B Viking Drive
Virginia Beach, VA 23452
Tel: (757) 463-7800
Fax: (757) 463 7407

Semiconductor Vacuum Group Inc.
Morgan Hill, CA 95037
Tel: (408) 955 1900
Fax: (408) 955 0229