



VA FLOWMETERS Handbook

Variable area flowmeters
in Categories II2G - II2D - II3G - II3D
non-electrical designs

Supplementary Installation and Operating Instruction



KROHNE

1	General	3
2	Safety instructions	4
2.1	Atmospheric conditions	4
2.2	Hot surfaces	4
2.3	Static electricity	5
2.3.1	Flow-induced charges	5
2.3.2	Charge build-up on non-conductive external parts caused by cleaning.....	5
2.4	Device specific notes.....	6
3	Description	10
3.1	Description code	10
3.2	Marking	10
4	Installation	12
4.1	Mounting and installation	12
4.2	Special conditions	12
5	Operation	13
5.1	Initial start-up	13
6	Service	14
6.1	Maintenance.....	14
6.2	Dismantling	15
7	KROHNE measuring technology - Product overview	16

**INFORMATION!**

This additional Operating Instruction apply to the explosion protected, non-electrical versions of the following variable-area flowmeters:

- *DK32 DK34*
- *DK37/M8M*
- *H250/M8MG*
- *H250/M9*
- *DK46 DK47 DK48 DK800*
- *GA24*
- *VA40*
- *and the level meter BW25/M9*

in Categories

- *II2G*
- *II2D*
- *II3G*
- *II3D*

and are supplementary to the Installation and Operating Instruction for the explosion protected versions. The directions given in this Instruction contain only the data relevant to explosion protection. The technical details given in the Installation and Operating Instruction for the explosion protected versions apply unchanged unless excluded or superseded by this Instruction. The type series of the non-electrical variable-area flowmeters and level meter listed above have been tested by the manufacturer in conformity with

EN 13463-1:2001

Non-electrical equipment for potentially explosive atmospheres

In accordance with Article 8b of Directive 94/9/EC (ATEX 100a), the test documentation has been deposited at the Physikalisch-Technische Bundesanstalt (PTB), Brunswick, under Registration Number:

PTB 03 ATEX D127 X

The devices in Categories II2G, II3G, II2D and II3D are of identical construction.

2.1 Atmospheric conditions

Atmospheric conditions

Potentially Explosive Atmosphere is defined as a mixture of air and combustible gases, vapour, mist or dust under atmospheric conditions with the values

$T_{\text{atm}} = -20^{\circ}\text{C} \dots +60^{\circ}\text{C} / -4^{\circ}\text{F} \dots 140^{\circ}\text{F}$ und $P_{\text{atm}} = 0,8 \dots 1,1 \text{ bar}$.

Outside this range, safety parameters for most ignition sources are not available.

Operating conditions

As a rule, variable-area flowmeters operate under field conditions that are outside the atmospheric conditions 0,8 bar up to 1,1 bar so that, for want of safety parameters, explosion protection – irrespective of the zone classification – is basically not applicable to the inside of the measuring tube.



CAUTION!

Operation with combustible products is therefore only allowed if a potentially explosive air mixture is not formed inside the flowmeter and level meter respectively. Where this condition is not met, the operator will need to assess the ignition hazard in each individual case and give due consideration to existing parameters (e.g. pressure, temperature, process product, materials of construction).

2.2 Hot surfaces

It must be assumed that the potentially explosive air mixture can come into contact with the outer wall of the measuring tube and the process connections. Any temperature gradient between the "wetted" inside wall (product temperature) and the outside surface is not taken into account.

The device itself does not generate any heat. The actual maximum surface temperature is dependent upon the operating conditions (process temperature; temperature of heat-transfer medium and of process fluid when device fitted with heating jacket).

Consequently, EN 13463-1, para. 14.2 (g) does not permit indication of any Temperature Classes. The max. allowed ambient and process temperatures are given in the standard Operating Instruction.

2.3 Static electricity

2.3.1 Flow-induced charges

In variable area flowmeters, it is possible under field conditions for charge separation to occur in the measuring tube due to the transport of non-conductive fluids and/or when the flow comes into contact with non-conductive internals (e.g. liners, floats).

In all-metal devices, the measuring tube and the welded process connections together form a shield (Faraday cage), from which the electric field cannot emerge.

In glass devices, it is basically possible for the electrostatic field generated inside the measuring tube to pass through to the outside of the device. For that reason, variable-area flowmeters and level meter must be permanently grounded by the operator by way of the process connections in order to discharge electrostatic build-up.

The operator is also responsible for extending the ground continuity of the process pipeline. If grounding cannot be made via the process connections (plastic process connections or undefined connections), the flowmeter must be connected to the local ground potential via the connection to ground. This connection only ensures electrostatic grounding of the device and does not meet the requirements for equipotential bonding.



CAUTION!

The apparatus shall not be used in areas in which strongly electrostatic charges, machine processes of rubbing and separating, the spray of electrons (e.g. in the environment of electrostatic painting facilities) as well as dust to be conveyed pneumatically, occur.

2.3.2 Charge build-up on non-conductive external parts caused by cleaning

Concerning the chargeability of non-conductive external parts caused e.g. by maintenance work and cleaning under atmospheric conditions, the surface limits specified in Section 4.4.3 of the CENELEC Report TR 50404 for Category II2G must be taken into consideration.

Devices where explosive electrostatic charges can be expected to be generated due to cleaning action are marked with an adhesive label:



CAUTION!

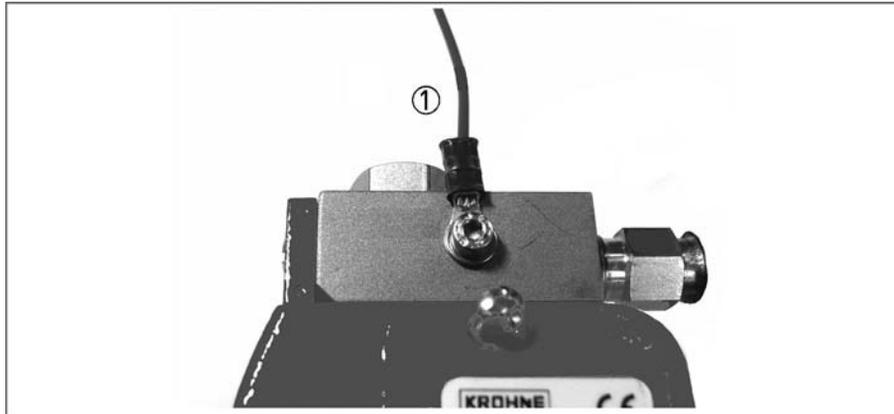
*Achtung! Gefahr elektrostatischer Aufladung! Nicht reiben!
Caution! Risk of electrostatic charge! Do not rub!*

To clean chargeable surfaces, use e.g. a damp cloth.

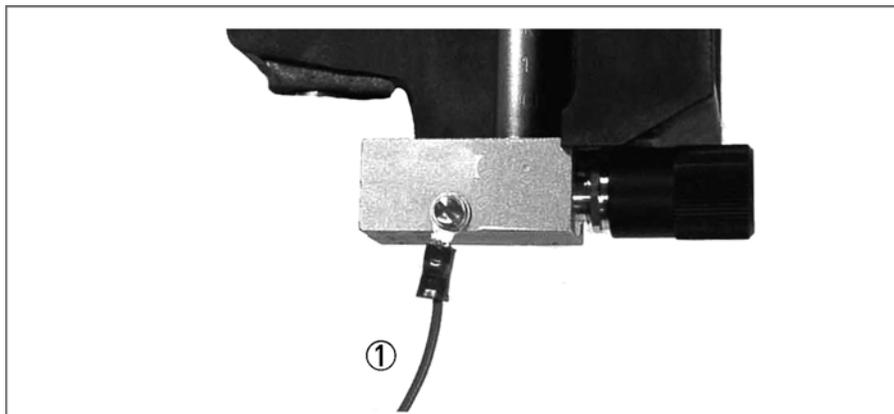
2.4 Device specific notes

If the device is not adequately grounded electrostatic via the process piping, make an additional ground connection by way of the grounding screw ①.

DK32 - DK34



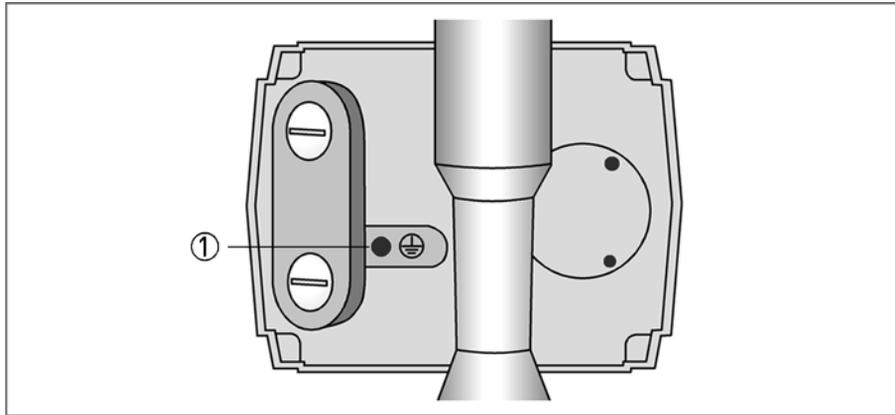
DK37/M8M



INFORMATION!

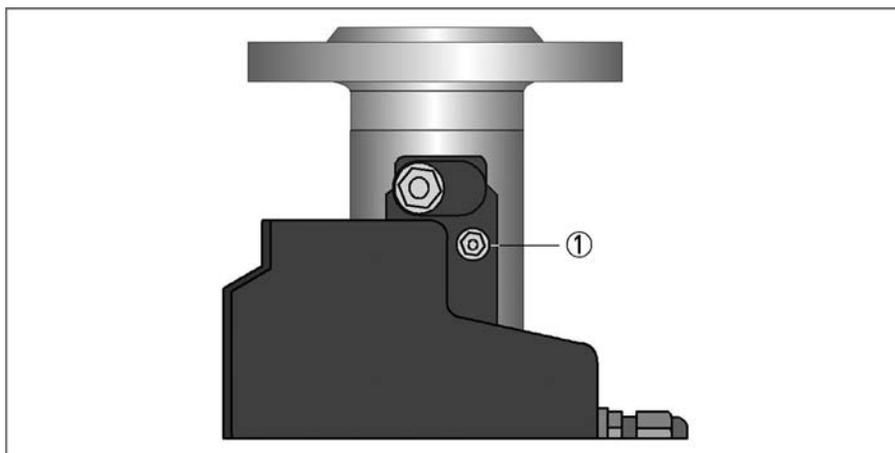
The indicator housing is made of conductive plastic material. Electrostatic charge due to friction can be ruled out.

H250/M9

**CAUTION!**

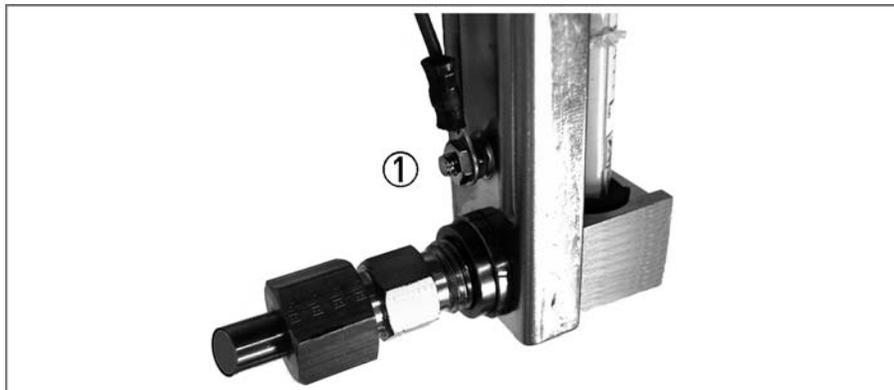
Where the viewing window is made of polycarbonate, note the information plate:
Achtung! Gefahr elektrostatischer Aufladung! Nicht reiben!
Caution! Risk of electrostatic charge! Do not rub!

H250/M8MG

**INFORMATION!**

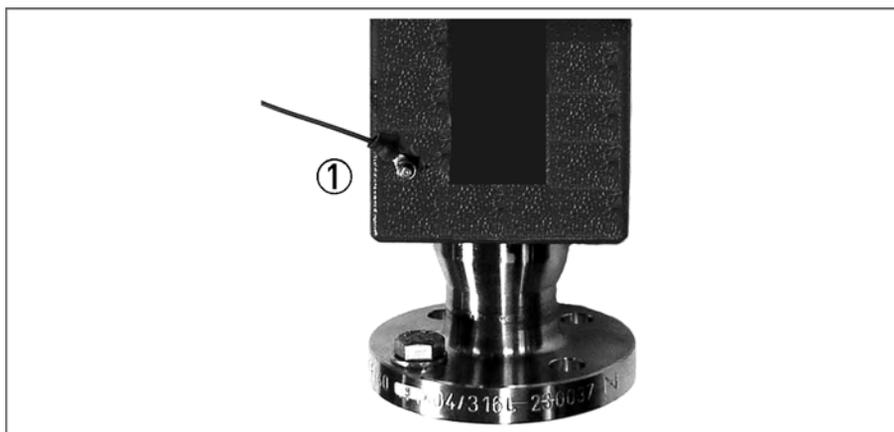
The indicator housing is made of conductive plastic material. Electrostatic charge due to friction can be ruled out.

DK46 - DK47 - DK48 - DK800



Ignition hazard due to electrostatic build-up in connection with the flow measurement of uncontaminated gases or fluids is not to be expected, provided the flow rate does not exceed 20 times the nominal flow rate. On no account may the max. allowed operating pressure PS imprinted on the nameplate be exceeded!

GA24



Ignition hazard due to electrostatic build-up in connection with the flow measurement of uncontaminated gases or fluids is not to be expected, provided the flow rate does not exceed 10 times the nominal flow rate. On no account may the max. allowed operating pressure PS imprinted on the nameplate be exceeded!

VA40



Ignition hazard due to electrostatic build-up in connection with the flow measurement of uncontaminated gases or fluids is not to be expected, provided the conductivity of the fluid does not drop below 1000 pS/m and the flow rate does not exceed 10 times the nominal flow rate. On no account may the max. allowed operating pressure PS imprinted on the nameplate be exceeded!

**CAUTION!**

The viewing window is made of polycarbonate, note the information plate:

Achtung! Gefahr elektrostatischer Aufladung! Nicht reiben!

Caution! Risk of electrostatic charge! Do not rub!

Level meter BW25/M9



Eliminate mechanical force like oncoming flow or spark formation at measuring system (e.g. by agitator) by a suitable installation, especially with displacement device material of titanium.

**CAUTION!**

Where the viewing window is made of polycarbonate, note the information plate:

Achtung! Gefahr elektrostatischer Aufladung! Nicht reiben!

Caution! Risk of electrostatic charge! Do not rub!

3.1 Description code

The applicable description code is that given in the standard Installation and Operating Instruction.

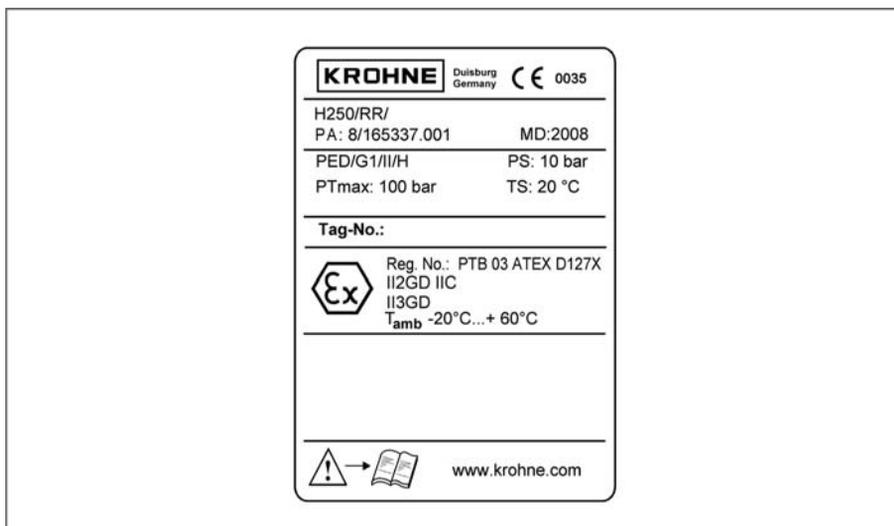
3.2 Marking

The flowmeters are marked with the following nameplates: (examples, not to scale)

Nameplate DK32 DK34



Nameplate H250/M9 - DK37/M8M - H250/M8MG - BW25/M9



Nameplate VA40 - GA24 - DK46 - DK47 - DK48 - DK800

SN: xxxxxxxxxxxxxxxx	MD: 200x	VGxxxxxxxxxxxxxxxxxxxx	PED/xx/x/x
SO: xxxxxx / xxx	PA No: xxxxxxxx.xxx	AC: Pxxxxxxxxxxxx	PS: xx bar TS: xxx°C
Tag-No:			PTmax: xx bar
DK800/...	KROHNE Duisburg Germany		www.krohne.com
 II2GD IIC	Reg.No. PTB 03 ATEX D127X		 0035
II3GD IIC	Tamb: -xx°C...+xxx°C  		

**CAUTION!**

Values (here marked xxx) are subject to the individual device versions and are specified on the relevant nameplate and in the Operating Instruction for the device.

- 0035 - Identification Number of the Notified body in respect of EC Pressure Equipment Directive 97/23/EC
- SN - Serial number
- MD - Manufacturing Date
- PS - (Pressure specified) max. operating pressure
- PT max. - (Pressure Test max.) max. test pressure
- TS - (Temperature Specified) max. operating temperature
- PED - Pressure equipment directive code (see also Operating Instruction)
- Tag-No. - Measuring-point identifier
- Reg.No. - PTB registration number
- Tamb. - Max. allowed ambient temperature
- VG - V- Number Germany
- SO - Sales Order Number
- PA - KROHNE Order Number
- AC - Article Code

4.1 Mounting and installation

In conformity with the operative installation standards for hazardous areas, mounting and installation work is required to be carried out by specialist personnel who have received training in explosion protection.

The directions given in the standard Installation Instruction and in these Additional Installation and Operating Instruction should be followed without fail.

Verify the suitability of the VA flowmeters for the application in question by checking the data given on the nameplate. Check compatibility of the process product with the wetted parts against the data specified in the order.

4.2 Special conditions

Mechanical tests

The flowmeters have undergone an impact test according to EN 13463-1.

- Explosion Group - II
- Level of mechanical hazard - low
- Additional marking - X

Additional protective measures are required where there is a higher mechanical hazard level.

Device	Impact energy (Joule)	
	Measuring sections, valves, controllers	Viewing window, cover translucent
DK32, DK34	4	not applicable
DK37/M8M	4	not applicable
H250/M8MG	4	not applicable
H250/M9	4	not applicable
DK46,DK47,DK48,DK800	4	2
GA24	4	2
VA40	4	2
BW25/M9	4	not applicable

5.1 Initial start-up

Before initial start-up, test the materials used for the measuring section and for the gaskets for adequate resistance to corrosion from the process product.

6.1 Maintenance

Indicator

The measuring and indicating sections are maintenance-free under normal operating conditions and when used for the designated purpose.

Measuring section

The measuring section is maintenance-free under normal operating conditions and when used for the designated purpose.

Depending on application, however, the measurement function may in unfavourable cases become impaired through soiling of the measuring cone or the float.

The measuring section should be cleaned as described in the Installation and Operating Instruction for the non-hazardous-duty versions.

The measuring section must be dismantled before it can be cleaned. In this connection, note the information given under "Replacement of the complete flowmeter".

Within the scope of checks required to be carried out in hazardous areas to maintain systems in proper working order, the following visual inspections should be carried out at regular intervals:

- Check of the measuring section for leakages.
- Inclusion of the flowmeter in the periodic pressure tests of the process pipeline.

Maintenance

Maintenance work of a safety-relevant nature within the meaning of explosion protection may only be carried out by the manufacturer, his authorized representative or under the supervision of authorized inspectors.

6.2 Dismantling

Replacement of indicator section

Due to the modular structure of the variable-area flowmeters, the indicator can be replaced with identical KROHNE replacement parts.

The measuring tube need not be removed and can remain in the pipeline. This also applies to pressurized pipes.



CAUTION!

As the case may be the loss of accuracy!

Replacement of complete flowmeter



CAUTION!

- *Pressurized pipes to be depressurized before removing the measuring section.*
- *Avoid uncontrolled discharge of residual fluid from the measuring section.*
- *Where environmentally critical substances are involved, carefully decontaminate the wetted parts of the measuring tube after dismantling*

- *Removal and installation are the responsibility of the operator.*

KROHNE measuring technology - Product overview

- Electromagnetic flowmeters
- Variable area flowmeters
- Mass flowmeters
- Ultrasonic flowmeters
- Vortex flowmeters
- Flow controllers
- Level measuring instruments
- Temperature measuring instruments
- Pressure measuring instruments
- Analysis
- Oil and gas industry

Addresses:

Germany

Northern sales office

KROHNE Messtechnik GmbH & Co. KG
Bremer Str. 133
D-21073 Hamburg
Phone: +49 (0)40 767 3340
Fax: +49 (0)40 767 33412
nord@krohne.com
ZIP code: 10000 - 29999, 49000 - 49999

Western and middle sales office

KROHNE Messtechnik GmbH & Co. KG
Ludwig-Krohne-Straße
D-47058 Duisburg
Phone: +49 (0)203 301 4416
Fax: +49 (0)203 301 10416
west@krohne.com
ZIP code: 30000 - 34999, 37000 - 48000, 50000 - 53999, 57000 - 59999, 98000 - 99999

Southern sales office

KROHNE Messtechnik GmbH & Co. KG
Landsberger Str. 392
D-81241 Munich
Phone: +49 (0)89 121 5620
Fax: +49 (0)89 129 6190
sued@krohne.com
ZIP code: 0 - 99999, 80000 - 89999, 90000 - 97999

Southwestern sales office

KROHNE Messtechnik GmbH & Co. KG
Rüdesheimer Str. 40
D-65239 Hochheim/Main
Phone: +49 (0)6146 827 30
Fax: +49 (0)6146 827 312
rhein-main@krohne.com
ZIP code: 35000 - 36999, 54000 - 56999, 60000 - 79999

Instrumentation and control equipment catalog

TABLAR Messtechnik GmbH
Ludwig-Krohne-Str. 5
D-47058 Duisburg
Phone: +49 (0)2 03 305 880
Fax: +49 (0)2 03 305 8888
kontakt@tablar.de; www.tablar.de

KROHNE sales companies

International

Australia

KROHNE Australia Pty Ltd
Quantum Business Park 10/287
Victoria Rd Rydalmere NSW 2116
Phone: +61 2 8846 1700
Fax: +61 2 8846 1755
krohne@krohne.com.au

Austria

KROHNE Gesellschaft m.b.H.
Modecenterstraße 14
A-1030 Vienna
Phone: +43 (0)1/203 45 32
Fax: +43 (0)1/203 45 32 99
info@krohne.at

Belgium

KROHNE Belgium N.V.
Brusselstraat 320
B-1702 Groot Bijgaarden
Phone: +32 (0)2 4 66 00 10
Fax: +32 (0)2 4 66 08 00
krohne@krohne.be

Brazil

KROHNE Conaut Controles
Automaticos Ltda.
Estrada Das Águas Espraiadas, 230
C.P. 56 06835 - 080 EMBU - SP
Phone: +55 (0)11-4785-2700
Fax: +55 (0)11 4785-2768
conaut@conaut.com.br

China

KROHNE Measurement Instruments
[Shanghai] Co. Ltd., [KMIC]
9th Floor, Puyuan Science Park,
Building A

396 Guilin Road
Shanghai 200233
Tel.: +86 (021) 6470 5656
Fax: +86 (021) 6451 6408
info@krohne-asia.com

Czech Republic

Krohne CZ, spol. s r.o.
Soběsická 156
63800 Brno
Phone: +420 (0)545.242.627
Fax: +420 (0)545 220 093
brno@krohne.cz

France

KROHNE S.A.S.
Les Ors BP 98
F-26103 ROMANS Cedex
Phone: +33 (0)4 75 05 44 00
Fax: +33 (0)4 75 05 00 48
info@krohne.fr

Great Britain

KROHNE Ltd.
Rutherford Drive
Park Farm Industrial Estate
Wellingborough
Northants NN8 6AE
Phone: +44 (0)19 33 408 500
Fax: +44 (0)19 33 408 501
info@krohne.co.uk

CIS

Kanex KROHNE Engineering AG
Business Centre "POLLARS", office
164
Derbenevskaya nab., 11-B
113114 Moscow/Russia
Tel. / Fax: +7 (0)495 913-68-41
Tel. / Fax: +7 (0)495 913-68-42
Tel. / Fax: +7 (0)495 913-68-43
Tel. / Fax: +7 (0)495 913-68-44
krohne@krohne.ru

India

Krohne Marshall Ltd.
A-34/35, M.I.D.C. Industrial Area,
H-Block
Pimpri Poona 411018
Phone: +91 (0)202 744 2020
Fax: +91 (0)202 744 2020
pcu@vsnl.net

Iran

KROHNE Liaison Office
North Sohravardi Ave. 26,
Sarmad St., Apt. #9
Tehran 15539
Phone: +9821 8874 5973
Fax: +9821 8850 1268
krohne@krohneiran.com

Italy

KROHNE Italia Srl.
Via V. Monti 75
I-20145 Milan
Phone: +39 02 4300 661
Fax: +39 02 4300 6666
info@krohne.it

Korea

KROHNE Korea
Room 508 Miwon Bldg 43
Yoido-Dong Youngdeungpo-Ku
Seoul, Korea
Phone: 00-82-2-782-1900
Fax: 00-82-2-780-1749
mail@krohne.co.kr

Netherlands

KROHNE Nederland B.V.
Kerkeplaat 14
NL-3313 LC Dordrecht
Phone: +31 (0)78 630 6200
Fax: +31 (0)78 630 6405
Service Direct: +31 (0)78 630 6222
info@krohne.nl

Norway

KROHNE Norway A.S.
Ekholteveien 114
NO-1521 Moss
Phone: +47 (0)69 264 860
Fax: +47 (0)69 267 333
postmaster@krohne.no

Poland

KROHNE Polska Sp.z.o.o.
ul. Stary Rynek Oliwski 8a
80-324 Gdansk
Phone: +48 (0)58 520 9211
Fax: +48 (0)58 520 9212
info@krohne.pl

Switzerland

KROHNE AG
Uferstr. 90
CH-4019 Basel
Phone: +41 (0)61 638 30 30
Fax: +41 (0)61 638 30 40
info@krohne.ch

Singapore

Tokyo Keiso - KROHNE (Singapore)
Pte. Ltd.
14, International Business Park,
Jurong East
Chiyoda Building, #01-01/02
Singapore 609922
Phone: (65) 6567 4548
Fax: (65) 6567 9874
tks@tokyokeiso-krohne.com.sg

Republic of South Africa

KROHNE Pty. Ltd.
Bushbuck Close
Corporate Park South
Midrand, Gauteng
P.O. Box 2069
Midrand, 1685
Tel.: +27 (0)11 314 1391
Fax: +27 (0)11 314 1681
midrand@krohne.co.za

Spain

I.I. KROHNE IBERIA, S.r.l.
Polígono Industrial Nilo
Calle Brasil, nº. 5
28806 Alcalá de Henares Madrid
Phone: +34 (0)91 883 2152
Fax: +34 (0)91 883 4854
krohne@krohne.es

USA

KROHNE, Inc.
7 Dearborn Road
Peabody, MA 01960
Phone: +1 (800) FLOWING
Phone: +1 (978) 535 6060 (in MA)
info@krohne.com

Representatives

Algeria
Argentina
Cameroon
Canada
Chile
Columbia
Croatia
Denmark
Ecuador
Egypt
Finland
Gabon
Ghana
Greece
Hong Kong
Hungary
Indonesia
Iran
Ireland
Israel
Ivory Coast
Japan
Jordan
Kuwait
Libya
Lithuania
Malaysia
Mauritius
Mexico
Morocco
New Zealand
Peru
Portugal
Romania
Saudi Arabia
Senegal
Slovakia
Slovenia
Sweden
Taiwan
Thailand
Tunisia
Turkey
Venezuela
Yugoslavia

Other countries

KROHNE Messtechnik GmbH & Co. KG
Ludwig-Krohne-Str. 5
D-47058 Duisburg
Phone: +49 (0)203 301 0
Fax: +49 (0)203 301 389
export@krohne.com