

Products for Fossil Fuel Power Plants

- **Combustion Technology**
- **Video-based Thermography**
- **Environmental Monitoring**
- **Environmental Data Management**




DURAG GROUP

Products for Fossil Fuel Power Plants

Dust Concentration Meter D-R 290

- Double pass method (optical transmission)
- LC Display in opacity, optical density or mg/m³
- Suitable for medium to high dust concentrations and medium to large duct diameters



Dust Concentration Meter D-R 300-40

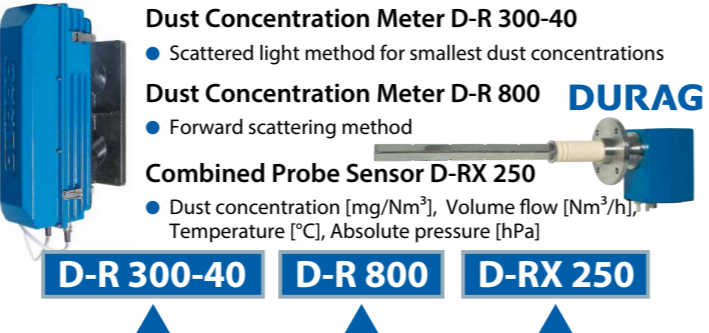
- Scattered light method for smallest dust concentrations

Dust Concentration Meter D-R 800

- Forward scattering method


Combined Probe Sensor D-RX 250

- Dust concentration [mg/Nm³], Volume flow [Nm³/h], Temperature [°C], Absolute pressure [hPa]




Filter Monitor D-FW 231

- Triboelectric broken bag detector, easy installation
- Detects the efficiency and function of filters and filtration systems



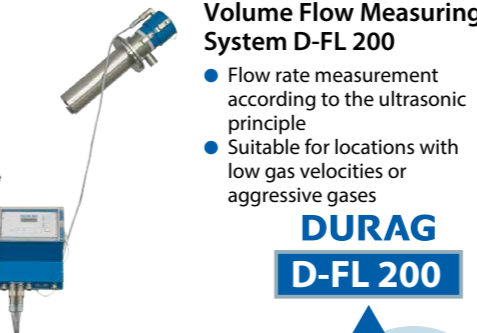
Dust and Opacity Monitor D-R 220

- Optical transmission analyser
- Monitoring in combustion and filter systems, ducts and warehouses



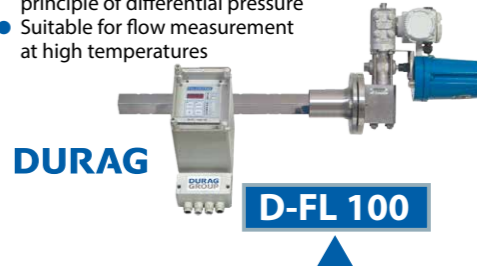
Volume Flow Measuring System D-FL 200

- Flow rate measurement according to the ultrasonic principle
- Suitable for locations with low gas velocities or aggressive gases



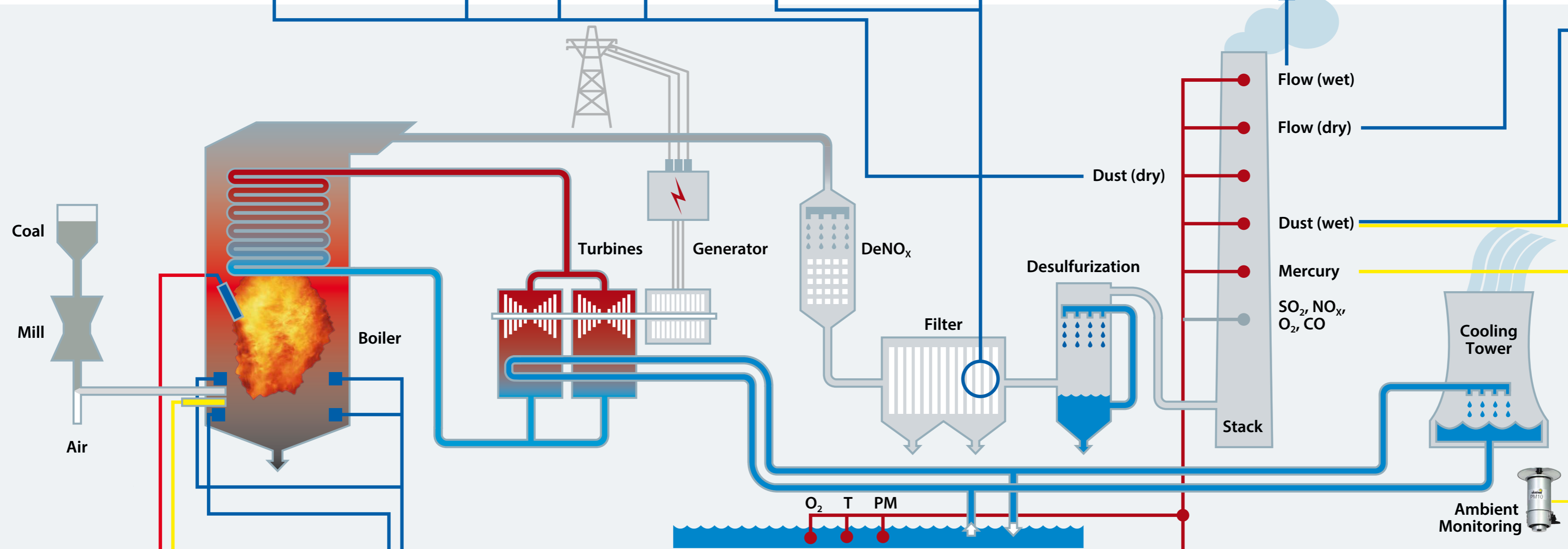
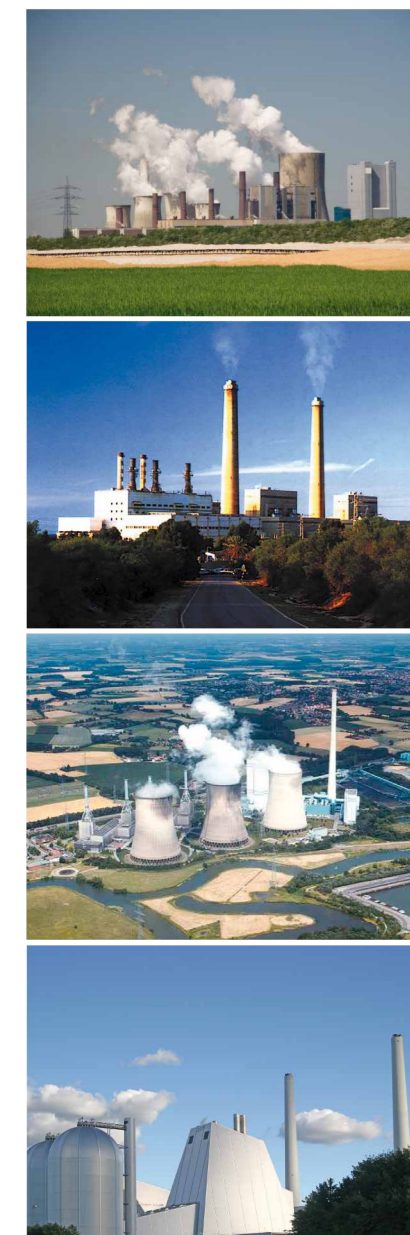
Volume Flow Measuring System D-FL 100

- Flow rate measurement according to the principle of differential pressure
- Suitable for flow measurement at high temperatures




Extractive Dust Monitor D-R 820 F

- For wet sample gas to monitor low to medium dust concentrations
- allows calibration to measure the dust concentration in mg/m³


Extractive Particulate Monitor F-904-20

- Dust measuring analyser especially for wet stack gases and for blast furnace gas (BFG) monitoring
- allows calibration to measure the dust concentration in mg/m³




Total Mercury Analyser HM-1400 TRX

- Thermocatalytic reduction method, no wet chemicals necessary
- Measuring range 0...45 µg/Nm³



Particulate Monitor F-701-20

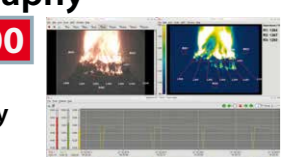
- Safe, stable C-14 source with low activity
- Measurement results unaffected by lack of homogeneity of the dust particles



Thermography D-VTA 200

Video-based Thermography System

- Detection of the temperature distribution inside combustion chambers
- Analysis of unbalanced combustion processes
- Burning analysis and slag monitoring in power plants

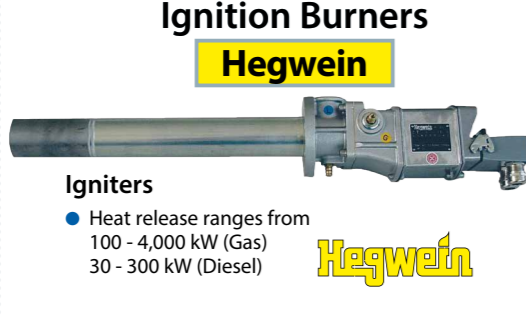


Ignition Burners Hegwein

Igniters D-HG 400 DURAG

High Energy Ignition Device

- Ignition of liquid or gaseous fuels with large power ratings
- Compact design: control unit and ignition lance form one unit
- Retraction Unit D-VE 500



Flame Monitoring D-LE 603

Flame Sensor


- Flame sensor for the monitoring of gas, oil and coal flames
- Primarily in multi-burner furnaces



Flame Monitoring D-UG 660

Control Unit


- Self-monitoring and fail-safe
- For the monitoring of gas, oil and coal flames with DURAG UV, UV+IR or IR- flame sensors
- Primarily in multiple-burner furnaces



Flame Monitoring D-LX 200

Compact Flame Monitor

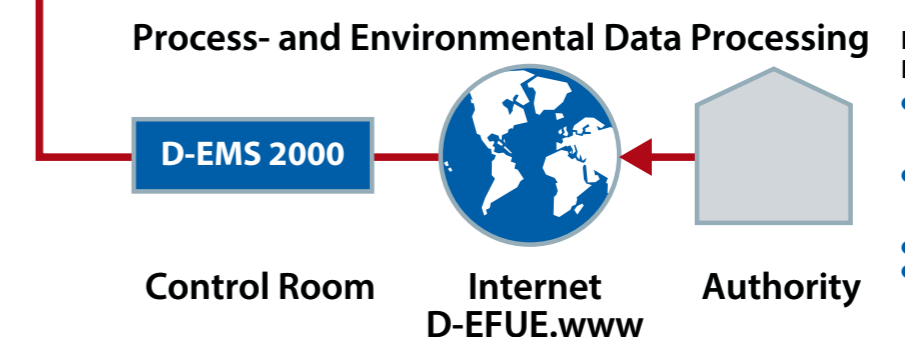
- Wide sensitivity range
- For ambient temperatures from -40°C up to +85°C
- Dual channel design throughout
- Measurement of flame flicker frequency
- Selective to individual burners and fuels



Process- and Environmental Data Processing D-EMS 2000

Environmental Data Management System D-EMS 2000

- Capturing, storing and evaluating of environmental data according to according European Directives and national regulations in compliance with EN 14181
- Emission data, immission data, waste water data, meteorological data, process conditions, time diagrams, correlation diagrams
- Including QAL3 CUSUM-card
- Internet representation

Application Details: DURAG GROUP Products in Fossil Fuel Power Plants

Flame Monitoring

The monitoring of the flame is a safety engineering element for industrial combustion technology – fuel may only enter the combustion chamber if safe combustion is guaranteed. Therefore high demands are made on the availability and safety of the equipment used. For intermittent operation it is sufficient when the flame monitoring hardware performs a self test during the startup procedure. Continuous operation requires a permanent verification of error free operation.

The monitoring can be performed by the combination of a flame sensor (also flame scanner) that transforms characteristic properties of the flame into an electrical signal, with a control unit that provides the flame signal and ensures error free operation. Alternatively these two parts are combined in one compact flame monitor.

Besides the proper selection of the flame monitor also its correct placement and alignment are important prerequisites for the successful monitoring of the flame. The presence of a flame must be correctly detected independently of the construction of the furnace or its operational mode.

Ionisation detection

Flame monitors with ionisation detectors. They are used primarily on smaller gas burners and pilot burners.

Detection of the optical signal

Larger burners are monitored solely by optical flame monitors. Depending on the fuel and combustion technology of the process optical sensors with different spectral sensitivities or combinations of them are used:

Infra-red detectors (IR)

react to radiation having a wavelength of 800 nm or higher. It is only the flickering of the flame which is analysed. Constant radiation sources, such as the glowing of the furnace walls, are not detected as a flame.

Flames radiating in the UV range, but whose UV component is absorbed by dust, steam or other substances, can often also be monitored using infra-red detectors.

Ultra-violet detectors (UV)

detect the flame radiation below 400 nm. Ultra-violet detectors are well suited for monitoring gas flames, but can also be used for oil flames. Products with the codes UL, US, UH, UA, and UAF use these detectors.

Visible radiation detectors (VIS)

are suitable for the monitoring of oil and coal flames between 400 and 800 nm. However, product guidelines in some countries stipulate that gas flames must not be monitored in this spectral range. Products with the codes IS, ISE, and ISO use these detectors.

Video-based Thermography

Disturbances of the local fuel-/air ratio of boiler plants and steam generators result in the following operational conditions:

- Localized combustion areas with high combustion temperatures and high formation of thermal NO_x
- Localized combustion areas with incomplete combustion and high formation of CO
- High flue gas losses and high amounts of unburned carbon (UBC) or loss of ignition (LOI)
- Local displacement of the main combustion zone compared to the design position
- Local overheating of boiler construction material
- High temperature corrosion and thermal stresses combined with boiler tube ruptures

Measures

Control of the combustion process through derived variations of firing parameters like:

- Uniform distribution of fuel
- Control of the combustion air distribution over the entire combustion zone

To achieve these targets, the online analysis of the actual firing situation has to deliver the following information:

- Detection of the local position of the main combustion zone
- Flame temperature distribution
- Local flame propagation
- Ignition point of flame
- Local fouling

Video System: Presentation of the Flame Picture

The furnace camera sensor of the DURAG Video System supplies online visual information directly from the combustion chamber to assist the operator in adjusting the complete combustion process optimally.

Thermographic System: Analysis of the Flame Temperature Distribution

The DURAG Thermographic System provides methods for:

- The thermal analysis of the spatial temperature distribution out of the combustion chamber
- Temperature determination within freely definable areas and lines (ROI-Region Of Interest and LOI- Line Of Interest)
- Detection of actual position of the combustion zone.

For automatic closed loop control measures all data of the thermographic systems can be transferred to the main process control system (DCS) at the customer site through standardized data interface.

Environmental Monitoring

The DURAG GROUP develops and manufactures products in the field of environmental measuring technology for measuring and monitoring

- dust concentration and opacity
- total mercury concentration
- flue gas volume flow

as well as evaluation systems for the calculation of emissions.

The products are used worldwide in power generation plants and the process industry, such as e.g. fossil fuel power stations, waste incineration plants, refineries, chemical processing plants, cement works, the lime industry, the steel industry, filter and dust extraction plants as well as for monitoring ambient air.

The DURAG Group is known for its high standards of quality. DURAG has been ISO 9001 certified for many years and has fully implemented the corresponding requirements. The products are manufactured to national, European and international standards.

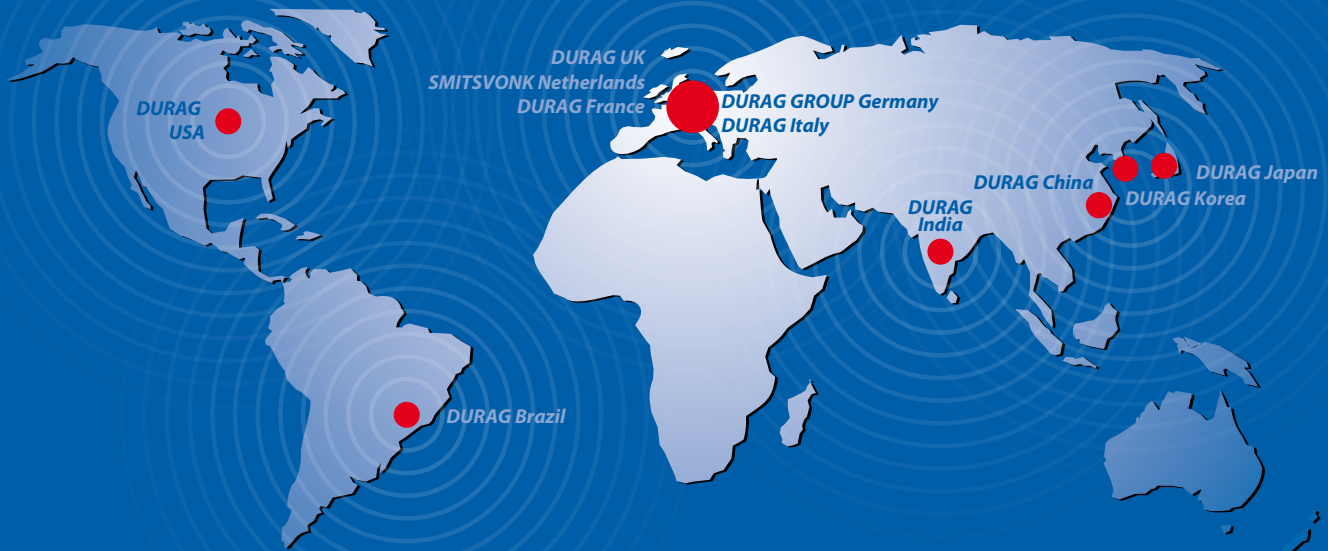
The following are taken into account:

- **VDI 2066 / VDI 3950** – German dust measurement standard
- **EN 14181** – European quality assurance standard for automatic measuring equipment
- **EN 15267** – European standard for type approval & certification of AMS/CEMS
- **EN 13284** – European standard for determining small dust concentrations
- **EN 14884** – European standard for determining total mercury concentration
- **EN 12341** – European standard for determining PM10 airborne dust
- **ISO 10473** – International standard for beta absorption method
- **ASTM D-6216.98** – American dust measurement standard.

DIN EN 14181

DIN EN 14181 defines three so-called quality assurance levels (QAL) and an annual functional test (AST) for automatic measuring systems:

- **QAL 1:** Requirement for use of automatic measuring equipment that has had its suitability tested (the test complies with DIN EN ISO 14956)
- **QAL 2:** Installation of automatic measuring system (AMS), calibration of AMS using the standard reference method (SRM), determination of measuring uncertainty / variability of AMS and check for observance of preset measuring uncertainties
- **QAL 3:** Continuous quality assurance by the operator (drift and precision of the AMS, verification on control card)
- **AST:** Annual surveillance test including SRM measurements to check the uncertainty of the AMS values.



DURAG

DURAG GmbH

Kollaustraße 105
22453 Hamburg, Germany
Tel. +49 40 55 42 18-0
Fax +49 40 58 41 54
E-Mail: info@durag.de

DURAG Niederlassung Nord

Kollaustraße 105
22453 Hamburg, Germany
Tel. +49 40 55 42 18-0
Fax +49 40 58 41 54
E-Mail: DURAG-Nord@durag.de

DURAG Niederlassung Ost

Halsbrücker Straße 34
09599 Freiberg, Germany
Tel. +49 3731 30 04-0
Fax +49 3731 30 04-22
E-Mail: DURAG-Ost@durag.de

DURAG Niederlassung Süd

Weidenweg 16
73087 Bad Boll, Germany
Tel. +49 7164 912 25-0
Fax +49 7164 912 25-50
E-Mail: DURAG-Sued@durag.de

DURAG Niederlassung West

An der Pönt 53a
40885 Ratingen, Germany
Tel. +49 2102 74 00-0
Fax +49 2102 74 00 28
E-Mail: DURAG-West@durag.de

International

DURAG, Inc., USA

1355 Mendota Heights Road · Suite 200
Mendota Heights · MN 55120, USA
Tel. +1 651 451-1710
Fax +1 651 457-7684
E-Mail: durag@durag.com

DURAG India Instrumentation Ltd

#27/30, 2nd Main Road
Industrial Town, Rajajinagar
Bengaluru 560 044, India
Tel. +91 80 2314 5626 / 4215 1191
Fax +91 80 2314 5627
E-Mail: info@duragindia.com

DURAG France S.a.r.l.

Parc GIP Charles de Gaulle
49, rue Léonard de Vinci, BP 70166
95691 Goussainville CEDEX, France
Tel. +33 1 301 811 80
Fax +33 1 393 383 60
E-Mail: info@durag-france.fr

DURAG Italia S.r.l.

Via Carlo Panseri, 118, CIM uffici, P. secondo
28100 Novara, Italy
Tel. +39 0321 679569
Fax +39 0321 474165
E-Mail: info@durag.it

DURAG UK Office

Suite 17, Brookside Business Park
Cold Meece, Stone, Staffordshire
ST15 0RZ, United Kingdom
Tel. +44 1785 760 007
Fax +44 1785 760 014
E-Mail: durag.uk@durag.de

DURAG Instrumentation (Shanghai) Co., Ltd.

Room 706, Dibao Plaza, No. 3998 Hongxin Rd.
Minhang District, Shanghai, 201103 PR China
Tel. +86 21 60732979-206
Fax +86 21 60732980
E-Mail: lianggc@durag-cn.com

DURAG Japan Office

c/o TMS Planning Inc.
291-2 Umena, Mishima-shi, Shizuoka-ken,
411-0816 Japan
Tel./Fax: +81 55 977 3994
E-Mail: saito@durag.jp

DURAG Korea Office

RM #1131, Manhattan Building,
36-2, Yeouido-Dong, Yeongdeungpo-Gu, Seoul,
Korea
Tel. +82 2 761 8970
Fax +82 2 761 8971
E-Mail: mac_lim@durag-group.co.kr

DURAG Brazil Office

Rua José Amaro Pecanha, 58
05126-150 Sao Paulo - SP, Brazil
Tel. +55 11 3906 8921
Fax +55 11 3902 2382
E-Mail: ednaldo@durag.com.br



DURAG data systems GmbH

Kollaustraße 105,
22453 Hamburg, Germany
Tel. +49 40 55 42 18-3000
Fax +49 40 55 42 18-3099
E-Mail: info@durag-data.de



DURAG process & systems technology gmbh

Kollaustraße 105
22453 Hamburg, Germany
Tel. +49 40 55 42 18-0
Fax +49 40 58 41 54
E-Mail: info@durag-process.de



VEREWA Umwelt- und Prozessmesstechnik GmbH

Kollaustraße 105
22453 Hamburg, Germany
Tel. +49 40 55 42 18-0
Fax +49 40 58 41 54
E-Mail: verewa@durag.de



Hegwein GmbH

Am Boschwerk 7
70469 Stuttgart, Germany
Tel. +49 711 135 788-0
Fax +49 711 135 788-5
E-Mail: info@hegwein.de



SMITSVONK Holland B.V.

P.O. Box 180, 2700 AD Zoetermeer
Loodstraat 57, 2718 RV Zoetermeer
Netherlands
Tel. +31 79 361 35 33
Fax +31 79 361 13 78
E-mail: sales@smitsvonk.nl

www.durag.de