Flame sensor

Flame sensor for monitoring gas, oil and coal flames, primarily in single burner view applications

D-LE 103

Features

- Self-monitoring and fail-safe in conjunction with a control unit/ burner control
- Flame sensors for every spectral range of flame monitoring from UV to IR
- Connection to D-UG 120 and D-UG 660 contol unit as well as D-GF 150 (-MB) burner control
- Uniform output signal thus mutually interchangeable
- Compliant to general safety regulations

Applications

- Power stations
- Chemical industry
- Refineries
- Cement plants
- Waste incinerators
- Steam generators
- Heating plants

Certifications

- DVGW
- UL 372
- FM Class 7610
- AGA: AS 4625
- EAC
- SIL3

Functional description

The photo element in the flame sensor generates a signal which is proportional to the flame radiation intensity. The output signal of the flame sensor is used as an input signal to a control unit or a burner control.
The D-LE 103 flame sensor is available with different photo elements for optimal selectivity when using different fuels.

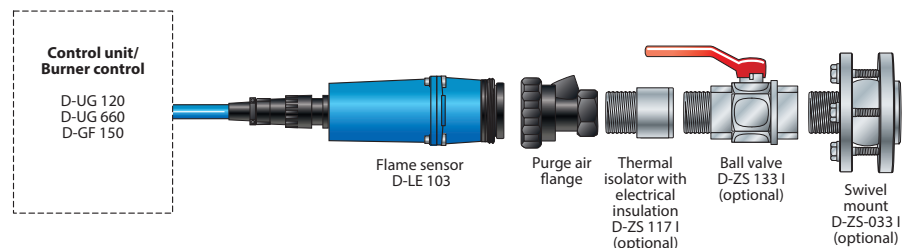## Models

- Cable gland (-CG)
- Axial plug (-P)

Accessories

- **Optical adjustment aid** for alignment of the swivel mount on the sighting tube (D-ZS 118)
- **UV-C test light source** 230 V/ 50 Hz (D-ZS 077-10)
- **UV-A, UV-B und IR test light source** 230 V/ 50 Hz (D-ZS 093)
- **Swivel Mount** for alignment of flame sensor to the flame to be monitored
- **Thermal isolator** with electrical insulation
- **Ball valve** for closing sighting tube
- **Terminal box** for connecting flame sensor (D-ZS 140)

Flame sensor selection

Flame sensor	Suitability for fuels			
	Gas	Oil	Coal	Wood
D-LE 103 UL	++	+		
D-LE 103 UAF	o	++		
D-LE 103 UA	+	++	o	+
D-LE 103 IS	!	++	++	+
D-LE 103 IG	o	++	++	++

++ ideally suited + well suited o conditionally suited ! not permitted   (from experience)

Control unit/ Burner control
D-UG 120
D-UG 660
D-GF 150

Flame sensor D-LE 103

Purge air flange

Thermal isolator with electrical insulation D-ZS 117 I (optional)

Ball valve D-ZS 133 I (optional)

Swivel mount D-ZS-033 I (optional)

Operational mode	Intermittent operation, continuous operation and 72-hour operation without permanent supervision	Viewing angle	6°
Safety	self-monitoring and fail-safe in conjunction with a control unit/ burner control	Perm. ambient temperature	-20 °C to +60 °C
Protection	with cable gland (D-LE 103 ... -CG) IP65 with axial plug (D-LE 103 ... -P) IP67	Dimensions Weight	Ø 80 mm, length approx. 350 mm approx. 1 kg
Gain	pre-set	Sighting tube connection	G 1¼"
High-pass filter	pre-set	Purge air connection	G ½"
Spectral ranges	UV, VIS, IR		

0085 DVGW product

EAC

c UL US

FM APPROVED

The Australian Gas Assoziation

DURAG GmbH
Kollaustrasse 105 · 22453 Hamburg · Germany

Tel. +49 (40) 554 218-0 · Fax +49 (40) 584 154
E-Mail: info@durag.de

www.durag.com

D-LE 603   D-LE 603 Ex

DURAG

Flame sensor

Flame sensor for monitoring gas, oil and coal flames, primarily in multi-burner view applications

D-LE 603

D-LE 603.../94Ex
D-LE 603.../95Ex

Features

- Self-monitoring and fail-safe in conjunction with a control unit/ burner control
- Flame sensors for every spectral range from UV to IR
- Connection to the D-UG 120 control unit, D-UG 660 control unit as well as to the D-GF 150 (-MB) burner control
- Uniform output signal thus mutually interchangeable
- Adjustable to different combustion technologies such as exhaust gas recirculation
- Compliance to general safety regulations
- ATEX approved (D-LE 603 .../94 Ex for zone 1 and D-LE 603 .../97Ex for zone 2)

Applications

- Power stations
- Chemical industry
- Refineries
- Cement plants
- Waste incinerators
- Steam generators
- Heating plants

Certifications

- DVGW
- UL 372
- FM Class 7610
- AGA: AS 4625
- EAC
- ATEX
- SIL3
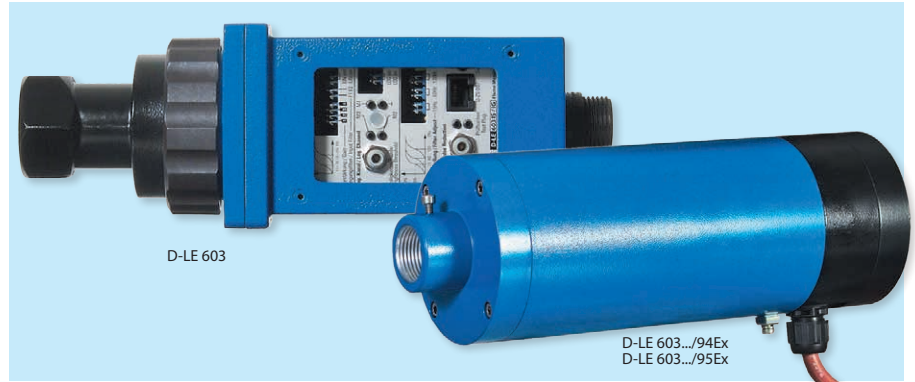
Functional description

The photo element in the flame sensor generates a signal which is proportional to the flame radiation intensity. The output signal of the flame sensor is used as an input signal to a control unit or a burner control.
The D-LE 603 flame sensor is available with different photo elements for maximum selectivity when using various fuels.
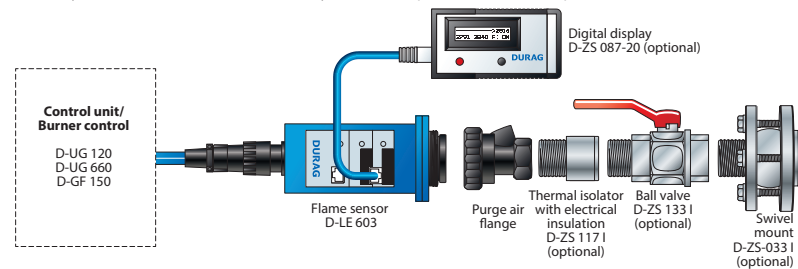
Accessories

- **Digital display** for optimal alignment of flame sensors (D-ZS 087 - 20)
- **Optical adjustment** aid for alignment of the swivel mount on the sighting tube (D-ZS 118)
- **UV-C test light source** 230 V/ 50 Hz (D-ZS 077-10)
- **UV-A, UV-B and IR test light source** 230 V/ 50 Hz
- **Swivel mount** for the alignment of the flame sensor
- **Thermal isolator** with electrical insulation
- **Ball valve** for closing the sighting tube
- **Terminal box** for connecting flame sensor (D-ZS 140/ 141).

Flame sensor selection

Flame sensor	Suitability for fuels				Features
	Gas	Oil	Coal	Wood	
D-LE 603 UH	++	o			selective single burner monitoring in multiple-burner plants
D-LE 603 US	++	+			at low UV radiation
D-LE 603 UAF	o	++			with intensive ambient light (neighbouring burners), gain switchover
D-LE 603 UA	+	++	+	o	at low NO$_x$ component, gain switch-over
D-LE 603 UI	++	++	+	+	remote changeover of spectral sensitivity
D-LE 603 IS	!	+	++	+	selective single burner monitoring (coal, oil)
D-LE 603 IG	o	+	++	++	selective single burner monitoring (coal, oil, wood)
D-LE 603 ISE	!		++		dual-channel flame sensor (LOG/LOG)
D-LE 603 ISO	!		++		dual-channel flame sensor (LIN/LOG)

++ ideally suited + well suited o conditionally suited ! not permitted   (from experience)

Digital display
D-ZS 087-20 (optional)

Control unit/
Burner control

D-UG 120
D-UG 660
D-GF 150

Flame sensor
D-LE 603

Purge air
flange

Thermal isolator
with electrical
insulation
D-ZS 117 I
(optional)

Ball valve
D-ZS 133 I
(optional)

Swivel
mount
D-ZS-033 I
(optional)

Operational mode	Intermittent operation, continuous operation and 72-hour operation without permanent supervision	**Dimensions**	90x92 mm, length approx. 350 mm	
		Weight	approx 1.8 kg	
Safety	Self-monitoring and fail-safe in conjunction with a control unit/ burner control	**Sighting tube connection**	G 1¼"	
		Purge air connection	G ½"	
Protection class	with cable gland (D-LE 603 ... -CG) IP65 with axial plug (D-LE 603 ... -P) IP67	**D-LE 603 .../9xEx**		
		Protection class	IP65	
Gain	four settings	**/94Ex /95Ex /96Ex /97Ex**	II 2G Ex de IIC T5/T6 Class I, Div. 1, Group B, C & D Class I, Div. 2, Group A, B, C & D II 3G Ex nAnC IIC T6	
High-pass filter	three settings			
Spectral ranges	UV, VIS, IR	**/94Ex, /95Ex Dimensions Weight**	Ø 130 mm, length 313 mm approx. 4.3 kg	
Viewing angle	6°			
Perm. ambient temperature	-20 °C to +60 °C	**Sighting tube connection**	G1" (/94Ex, /95Ex) G 1¼" (/96Ex, /97Ex)	

www.durag.com

DURAG

Flame sensor with fibre optic system

Systems for flame monitoring:

D-LE 701 flame sensor with
– flexible fibre optic system D-LL 701
– rigid fibre optic system D-LL 702

D-LE 703 flame sensor with
– flexible fibre optic system D-LL 703
– rigid fibre optic system D-LL 704

Features

- Self-monitoring and fail-safe flame sensor with a fibre-optic connection in conjunction with a control unit/ burner control
- Monitoring of gas, oil and coal flames
- Connection to the D-UG 120, D-UG 660 control unit and the D-GF 150 (-MB) burner control
- Spectral range from UV to IR
- Uniform output signal thus mutually interchangeable
- Adjustable to different combustion technologies such as exhaust gas recirculation

Applications

- Burners with difficult installation conditions for conventional flame sensors or on those where ambient temperature near the sighting tube is very high
- Power stations
- Chemical industry
- Refineries
- Cement plants
- Waste incinerators
- Steam generators
- Heating plants

Certifications

- DVGW
- EAC
- SIL3

D-LE 701   D-LE 703
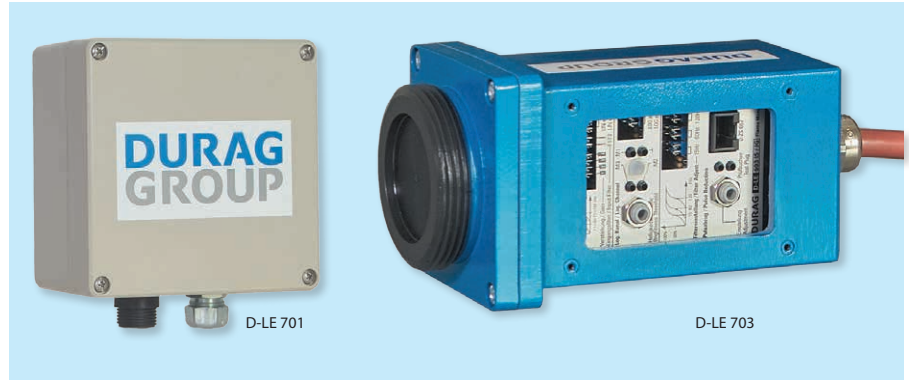
Functional description

The fibre optic system may be integrated directly into the hot area of the burner. It transfers the radiation from the flame over a fibre optic bundle to the flame sensor installed outside the burner. It is available in different lengths.
The photo element in the flame sensor generates a signal which is proportional to the flame radiation intensity. The output signal of the flame sensor is used as an input signal to a control unit or a burner control.

Accessories

- **Digital display** for measuring the pulse rate and its extreme values (D-ZS 087-20)
- **UV-A, UV-B and IR test light source** 230 V/ 50 Hz (D-ZS 093)
- **Terminal box** for connecting flame sensor (D-ZS 140)
- **Installation flange** for D-LL 702 for fibre optic system (D-ZS 702)
- **Welding flange** for D-LL 702 for fibre optic system (D-ZS 704)

Flame sensor selection

Flame sensor	Suitability for fuels				Features
	Gas	Oil	Coal	Wood	
D-LE 701 / 703 UAF	o	++			with intensive ambient light (neighbouring burners), gain switchover
D-LE 701 / 703 UA	+	++	+		with low NO$_x$ component, gain switchover
D-LE 701 / 703 IS	!	+	++	+	selective single burner monitoring (coal, oil)
D-LE 701 IGA / 703 IG	o	+	++	++	selective single burner monitoring (coal, oil, wood)

++ ideally suited   + well suited   o conditionally suited   ! not permitted   (from experience)
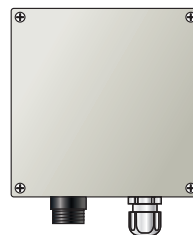
Flame sensor
D-LE 701
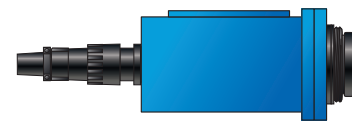
Flame sensor
D-LE 703

D-LE 701 flame sensor		D-LE 703 flame sensor	
Operation mode	Intermittent operation, continuous operation and 72-hour operation without permanent supervision	**Operation mode**	Intermittent operation, continuous operation and 72-hour operation without permanent supervision
Safety	Self-monitoring and fail-safe in conjunction with a control unit/ burner control	**Safety**	Self-monitoring and fail-safe
Protection	with cable gland (D-LE 701 ... -CG) IP65 with axial plug (D-LE 701 ... -P) IP67	**Protection**	with cable gland (D-LE 703 ... -CG) IP65 with axial plug (D-LE 703 ... -P) IP67
Gain	four settings	**Gain**	four settings
High-pass filter	three settings	**High-pass filter**	three settings
Spectral ranges	UV, VIS, IR	**Spectral ranges**	UV, VIS, IR
Perm. ambient temperature	-20 °C to +60 °C	**Perm. ambient temperature**	-20 °C to +60 °C
Dimensions Weight	160x185x100 mm (WxHxD) approx. 1.2 kg	**Dimensions Weight**	90x92 mm, length approx. 270 mm approx 1.2 kg

Tel. +49 (40) 554 218-0 · Fax +49 (40) 584 154
E-Mail: info@durag.de

www.durag.com

Fibre optic systems

The flexible and rigid fibre optic systems may be integrated directly into the hot area of the burner. It transfers the radiation from the flame over a fibre optic bundle to the flame sensor installed outside the burner
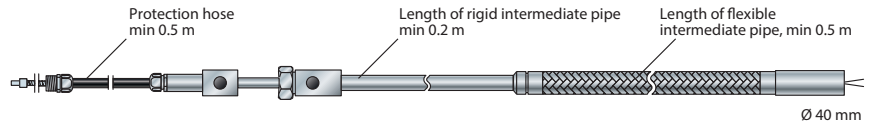
D-LL 701 fibre optic system

- Flexible fibre optic system
- Flame sensor and optics of the fibre optic system are connected by a glass fibre bundle which is surrounded by a flexible protection hose
- Suitable for temperatures up to 350 °C

Protection hose min 0.5 m · Length of rigid intermediate pipe min 0.2 m · Length of flexible intermediate pipe, min 0.5 m · Ø 40 mm

D-LL 701: flexible fibre optic system for D-LE 701			
Spectral ranges	UV, IR	Purge air connection	G ½"
Viewing angle	6°	Intermediate pipe material	1.4301
Perm. ambient temperature	-40 °C to +350 °C (optical system)	Weight	approx. 1.6 kg + 1 kg/m

D-LL 702 fibre optic system

- Rigid fibre optic system
- Flame sensor and optics of the fibre optic system are connected by a glass fibre bundle which is surrounded by a flexible protection hose
- Suitable for temperatures up to 350 °C

Protection hose min 0.5 m · Rigid guiding tubing min 0.2 m, max 15 m · Ø 22 mm

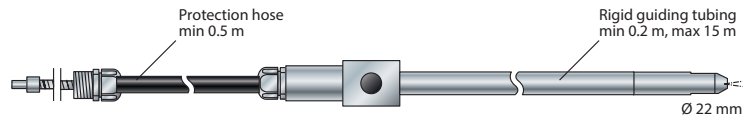| D-LL 702: rigid fibre optic system for D-LE 701			
Spectral ranges	UV, IR	Purge air connection	G ½"
Viewing angle	6°	Guiding tube material	1.4301
Perm. ambient temperature	-40 °C to +350 °C (optical system)	Weight	approx. 1.6 kg + 1 kg/m

D-LL 703 fibre optic system

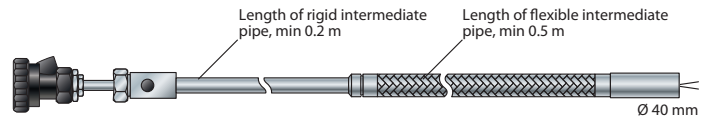- Flexible fibre optic system
- For combination with flame sensor or compact flame monitor
- The optics of the fibre optic system are connected to the sensor by a multiple protected glass fibre bundle
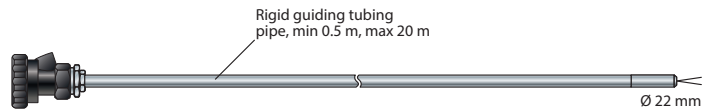- Suitable for temperatures up to 350 °C

Length of rigid intermediate pipe, min 0.2 m · Length of flexible intermediate pipe, min 0.5 m · Ø 40 mm

D-LL 703: flexible fibre optic system for D-LE 703 and D-LX 720			
Spectral ranges	UV, IR	Cooling air connection	G ½"
Viewing angle	6°	Intermediate pipe material	1.4301
Perm. ambient temperature	-40 °C to +350 °C (optical system)	Weight	approx. 3 kg + 1 kg/m
Purge air connection	G ½"		

D-LL 704 fibre optic system

- Rigid fibre optic system
- For combination with flame sensor or compact flame monitor
- The optics of the fibre optic system are connected to the sensor by a multiple protected glass fibre bundle
- Suitable for temperatures up to 350 °C

Rigid guiding tubing pipe, min 0.5 m, max 20 m · Ø 22 mm

D-LL 704: rigid fibre optic system for D-LE 703 and D-LX 720			
Spectral ranges	UV, IR	Cooling air connection	G ½"
Viewing angle	6°	Guiding tube material	1.4301
Perm. ambient temperature	-40 °C to +350 °C (optical system)	Weight	approx. 2 kg + 1 kg/m
Purge air connection	G ½"		

Applications

- Tilting burner (flexible system)
- Burners with difficult installation conditions for conventional flame sensors or on those whose ambient temperature near the sighting tube is too high
- Power stations
- Chemical industry
- Refineries
- Cement plants
- Waste incinerators
- Steam generators, heating plants

DURAG GmbH
Kollaustrasse 105 · 22453 Hamburg · Germany

Tel. +49 (40) 554 218-0 · Fax +49 (40) 584 154
E-Mail: info@durag.de

www.durag.com

D-GT 800

DURAG

Flame sensor

Flame sensor for monitoring gas and oil flames, primarily in gas turbines or in particularly harsh environments

D-GT 800-P

Features

- Self-monitoring and fail-safe in conjunction with a control unit/ burner control
- Deployable with high combustion chamber overpressure and with strong vibrations
- Connection to the D-UG 120, D-UG 660 control units and the D-GF 150 (-MB) burner control
- Optionally available with air/water cooling
- Compliant to general safety regulations
- Flame monitoring in the UV-range from 190 to 570 nm
- ATEX-approved (D-GT 800/801../Ex)

Applications

- Burners with difficult installation conditions for conventional flame sensors or on those where ambient temperature near the sighting tube is very high
- Power stations
- Chemical industry
- Refineries
- Cement plants
- Waste incinerators
- Steam generators
- Heating plants
- Gas turbines

Certifications (only D-GT 800/801)

- DVGW
- EAC
- ATEX

Functional description

With its combination of a highly sensitive photo element and sturdy design, the D-GT 800/801 flame sensors are ideal for use in harsh environments such as in gas turbines. The photodiode used can detect almost all blue burning flames, such as gas flames having only a low radiation component in the visible range.
The D-GT 800/801 is available with different photo elements for optimal selectivity when using different fuels.

Flame sensor selection

Flame sensor	Suitability for		Features
	Gas	Oil	
D-GT 800/801 UAF	o	++	with intensive ambient light (neighbouring burners)
D-GT 800/801 UA	+	++	at low NO$_x$ component

++ ideally suited + well suited o conditional suited ! not permitted   (from experience)

Models

- Cable gland connection (-Ex)
- Axial plug (-P)
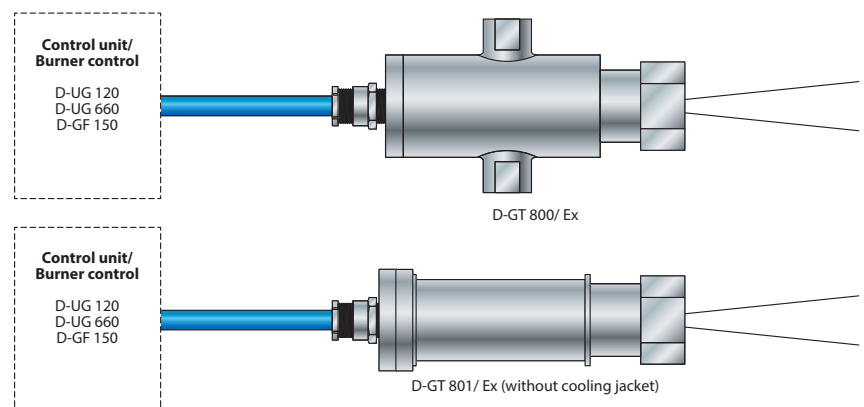- Available with air or water cooling for very high temperatures (D-GT 800)

Accessories

- **UV-A, UV-B and IR test light source** 230 V/ 50 Hz (D-ZS 093)
- **Terminal box** for connecting the flame sensor (D-ZS 140, D-ZS 141)

Control unit/ Burner control
D-UG 120
D-UG 660
D-GF 150

D-GT 800/ Ex

Control unit/ Burner control
D-UG 120
D-UG 660
D-GF 150

D-GT 801/ Ex (without cooling jacket)

Operational mode D-GT 800/801	Intermittent operation, continuous operation and 72-hour operation without permanent supervision	**Perm. ambient temperature**	Without cooling: -20 °C to +120 °C Air cooling: -20 °C to +200 °C Water cooling: -20 °C to +300 °C
Safety	Self-monitoring and fail-safe in conjunction with a control unit/ burner control	**Vibration**	10 g
		Dimensions	Ø 100 mm; length approx. 190 mm
Protection	With cable gland (D-GT 800/801 -P) IP67 Ex-Version (D-GT 800/801 .../Ex) IP66	**Weight**	Without cooling: approx. 1.5 kg with cooling: approx. 2.0 kg
Ex-Protection (D-GT 800/801../Ex)	II 2G Ex d T4/T5/T6	**Max combustion chamber overpressure**	30 bar
Spectral range	UV	**Sighting tube connection**	¾" NPT (F)
Viewing angle	6°	**Cooling connection**	½" NPT (F)

DURAG

D-GF 150-MB

Burner control

Self-monitoring and fail-safe burner control for the control of gas and oil burners as well as combined gas/ oil burners of any capacity

Features

- Controlling and monitoring of gas and oil burners of any capacity
- Suitable for intermittent operation as well as continuous operation
- Integrated gas valve monitoring system
- Separate outputs for control of gas and oil fuel valves
- Quick fuel change "on the fly" without burner shut down
- Adjustable pre-purge timer
- Integrated flame monitor
- Input for external flame monitor
- Data interfaces
- Status displays (LED or text)

Applications

- Chemical industry
- Refineries
- Cement plants
- Waste incinerators
- Steam generators
- Heating plants

Certifications

- DVGW
- UL 372
- FM Class 7610
- AGA: AS 4625
- EAC
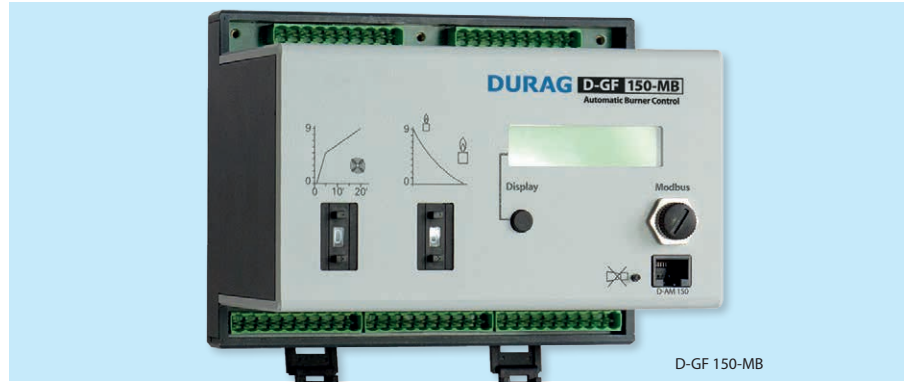
Functional description

Generally used fuel types and burners require certain synchronised program cycles and safety times for burner start-up which are controlled and monitored electronically with the burner control.

The following program cycles may be selected on the D-GF 150 automatic firing device:
- Gas fuel with boiler pre-purge
- Gas fuel without boiler pre-purge
- Oil fuel with boiler pre-purge
- Oil fuel without boiler pre-purge.

D-GF 150-MB
- Integrated text display for messages of status, program step and errors
- RS485 communication port for supply of parameters, settings and present status via Modbus protocol
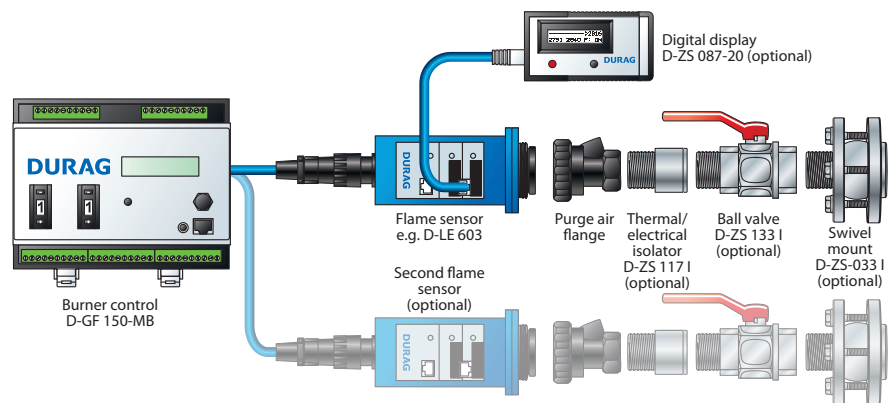
Flame sensors

- D-LE 103 for standard applications
- D-LE 603 for selective flame monitoring
- D-LE 701/ 703 for special applications with fibre-optic systems
- D-GT 800 for particularly harsh environments
- Flame sensor for use in potentially explosive atmospheres are also available

Design

- Device installed on the TS 35 DIN-rail.

Additional equipment

- **First out annunciator, plain text display, fieldbus communication** (D-AM 150)
- **Digital display** for optimal adjustment of the flame sensors by measuring the pulse rate and its extreme values (D-ZS 087 - 20)

Digital display
D-ZS 087-20 (optional)

Burner control
D-GF 150-MB

Flame sensor
e.g. D-LE 603

Second flame
sensor
(optional)

Purge air
flange

Thermal/
electrical
isolator
D-ZS 117 I
(optional)

Ball valve
D-ZS 133 I
(optional)

Swivel
mount
D-ZS-033 I
(optional)

Operational mode	Intermittent operation, continuous operation, 72-hour operation without permanent supervision	Flame sensor	1, 2 parallel or external flame
		Display	LED
Safety	Self-monitoring and fail-safe	Flame intensity	0/4 ... 20 mA
Electrical connection	115/ 230 VAC , 50/ 60 Hz	Data output	to D-AM 150/ D-ZS 087-20
Protection	IP20	Dimensions Weight	170x130x114 mm (WxHxD) approx. 1.5 kg
Perm. ambient temperature	-20 °C to +60 °C	**D-GF 150-MB**	
Installation	DIN-rail TS 35	Display	Text display of status, program step and errors
Threshold setting	0 ... 9	Data output	Direct Modbus port
Pre-purge	30 s ... 20 min		

0085
DVGW
product

c UL us

FM
APPROVED

The Australian
Gas Association

EAC

D-AM 150

DURAG

Display module

Extension module for the D-GF 150 automatic firing device with functions ranging from first out annunciator to plain text display up to fieldbus communication
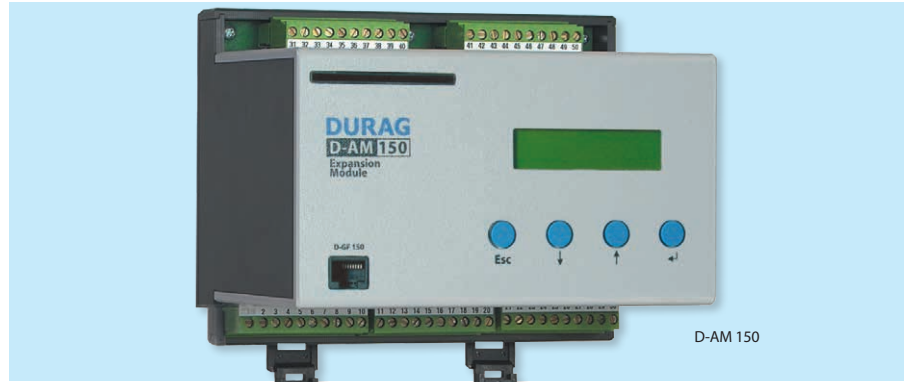

D-AM 150

Features

- Plain text display for the burner control D-GF 150
- Initial value indicator with 24 inputs in three groups
- Fault memory
- Text editor for plain text display
- Output relay for control via Fieldbus
- Operational hours counter
- Cycle counter
- Chip card for ease of programming
- Fieldbus communication (MODBUS-RTU) for up to 32 devices
- Can be combined with D-GF 150 as well as D-GF 150-MB

Applications
- Chemical industry
- Refineries
- Cement plants
- Waste incinerators
- Steam generators
- Heating plants

Certifications

- DVGW
- UL 372

Functional description

The D-AM 150 display module upgrades the burner control D-GF 150 with

- A plain text display (LCD) for showing the current program cycle of the burner control as well as the remaining run-time.
- The supported user displays include:
  - Flame signal
  - Error message
  - Operational hours of the burner
  - Burner cycles
  - Date and time
- A first out annunciator for the continuous monitoring of all connected limiters and monitor chains. Should the system be shut down, the position in which chain the shutdown is performed is stored.
- A MODBUS interface for outputting status and process information for the burner and D-GF 150 burner control.

Design

- Device for assembling onto TS 35 DIN-rail

Additional equipment

- **Chip card for data storage** and parameterisation (D-AM 150 CC)
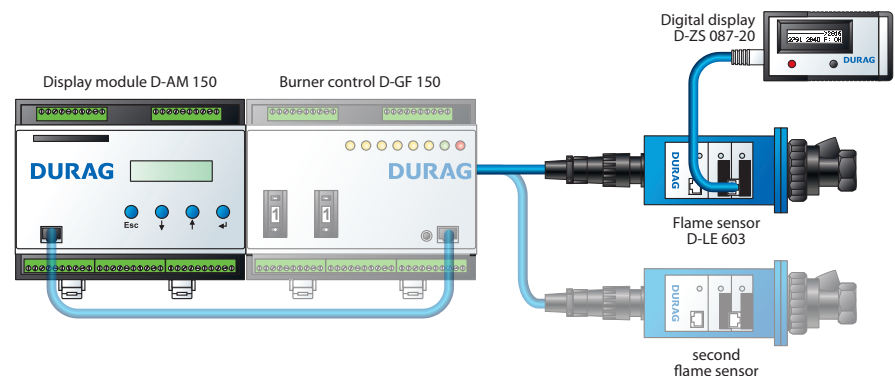
Display module D-AM 150   Burner control D-GF 150   Digital display D-ZS 087-20
Flame sensor D-LE 603
second flame sensor

Operational mode	Intermittent operation, continuous operation, 72-hour operation without permanent supervision	Installation	DIN-rail TS 35
		Dimensions	170x130x114 mm (WxHxD)
Safety	First our annunciator: fail-safe	Weight	approx. 1.2 kg
Electrical connection	115/ 230 VAC, 50/ 60 Hz	Display	Alpha-numeric LCD display
Protection	IP20	Data output	Modbus RTU
Perm. ambient temperature	-20 °C to +60 °C		

D-UG 660

DURAG

Control unit

Self-monitoring and fail-safe control unit for monitoring gas, oil and coal flames with DURAG UV, UV+IR or IR-flame sensors, primarily in multi-burner view applications

D-UG 660

Features

- Suitable for intermittent operation as well as continuous operation
- Optional parallel operation of two flame sensors in any combination: UV/ UV, UV/IR or IR/ IR
- Three different settings supported for various modes (e.g. dependent on fuel or combustion technology), automatic activation by burner management system
- Plain text display

Applications

- Power stations
- Chemical industry
- Refineries
- Cement plants
- Waste incinerators
- Steam generators
- Heating plants

Certifications

- DVGW
- UL 372
- FM Class 7610
- AGA: AS 4625
- EAC
- SIL3

Functional description

The D-UG 660 control unit analyses the flame radiation via the pulse signal of the flame sensor connected.
The easy-to-read LCD display continually shows information on the defined setting and operational status.
The flame intensity and signal are present at two current outputs 0/4 ... 20 mA for further analysis.

Flame sensors

- D-LE 103 for standard applications
- D-LE 603 for selective flame monitoring
- D-LE 701/ 703 for special applications (fibre optics)
- D-GT 800 for particularly harsh environments
- Sensors for Ex-applications are also available

Design

- Plug-in module (21HP and 3RU) for 19" racks (IP00)
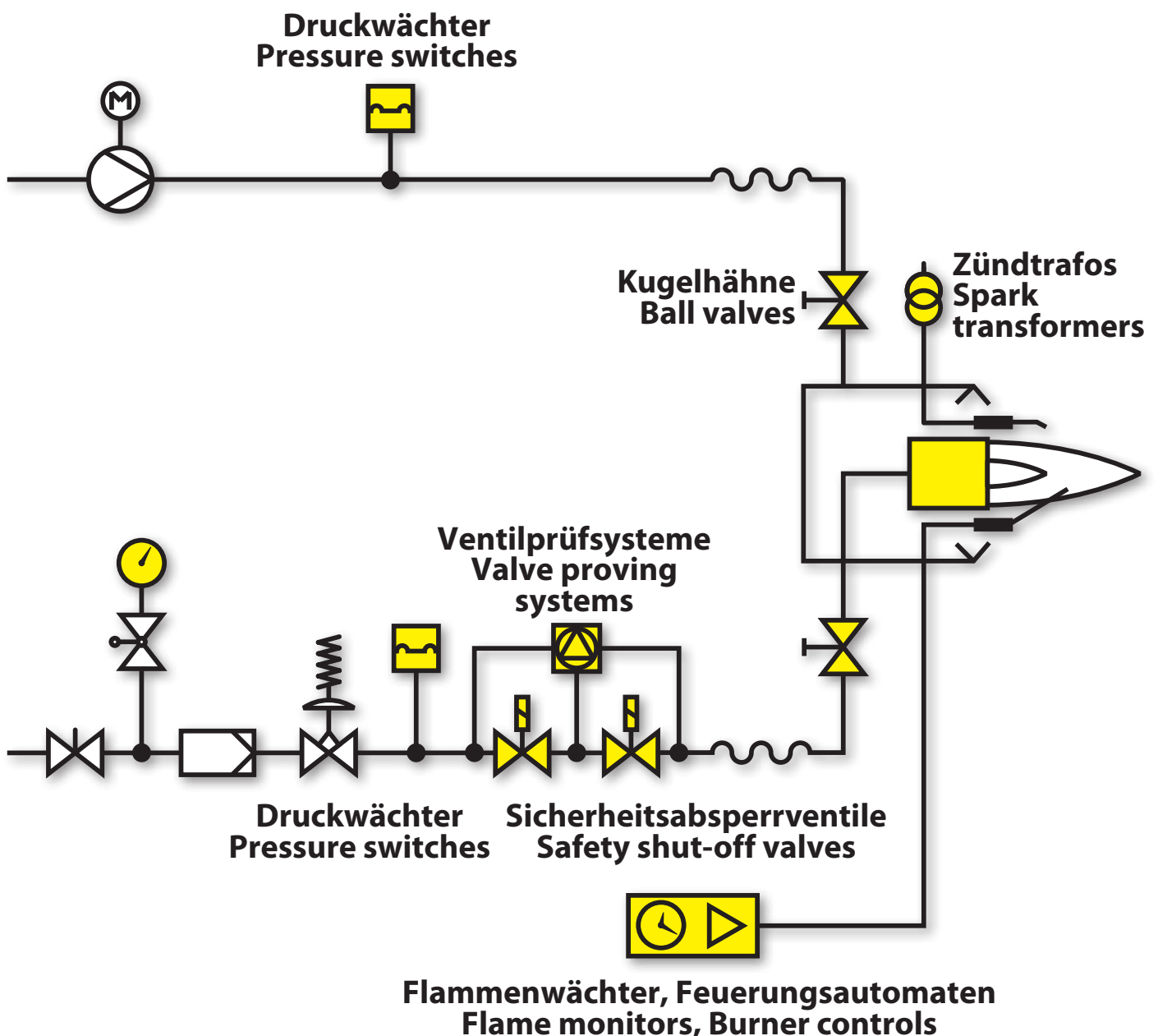
Accessories

- **Digital display** for optimal adjustment of the flame sensors by measuring the pulse rate and its extreme values (D-ZS 087 - 20)
- **Optical adjustment aid** for the alignment of the swivel mount on the sighting tube (D-ZS 118)
- **UV-C test light source** 230 V/ 50 Hz (D-ZS 077-10)
- **UV-A, UV-B and IR test light source** 230 V/ 50 Hz (D-ZS 093)
- **Swivel mount** for alignment of flame monitor to the flame to be monitored
- **Thermal isolator** with electrical isolation
- **Ball valve** for closing sighting tube
- **Terminal box** for connecting flame monitor (D-ZS 140/ 141)
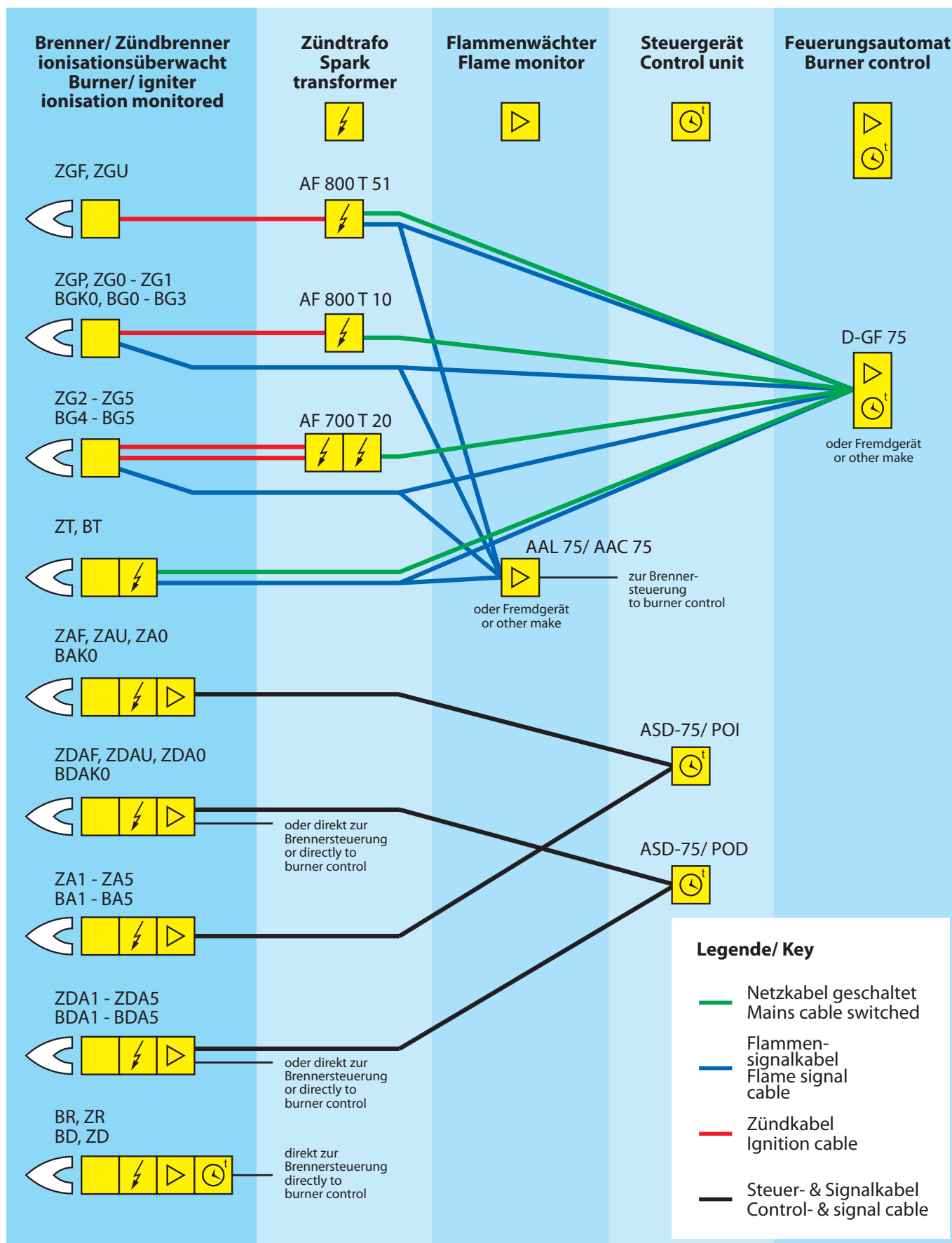- Various **enclosures and racks** for 1 to 4 devices

Digital display D-ZS 087-20 (optional)

Control unit D-UG 660

Flame sensor e.g. D-LE 103

Second flame sensor (optional)

Purge air flange

Thermal isolator with electrical insulation D-ZS 117 I (optional)

Ball valve D-ZS 133 I (optional)

Swivel mount D-ZS-033 I (optional)
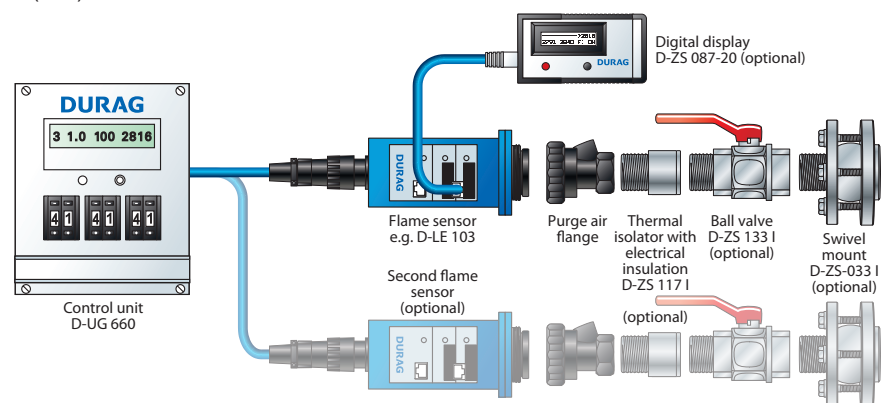
Operation mode	Intermittent operation, continuous operation, 72-hour operation without continual supervision	**Pre-configurable combinations of switching threshold and safety time**	3	
Safety	Self-monitoring and fail-safe	**Flame sensor connection**	1 or 2 (parallel)	
Electrical connection	24/ 48 VDC, 115/ 230 VAC	**Display**	alpha-numeric LCD display	
Protection	IP00	**Flame intensity**	0/4 ... 20 mA	
Flame relay	1x switch-over contact, 230 VAC, 2 A	**Flame signal**	0/4 ... 20 mA	
Status relay	1x switch-over contact, 230 VAC, 2 A	**Perm. ambient temperature**	-20 °C to +60 °C	
Threshold setting	00 ... 99	**Dimensions**	19" plug-in module, 3 RU, 21 HP	
FFDT (safety time)	1 ... 5.5 s	**Weight**	approx. 1 kg	

Zubehör
für Brenner und Zündbrenner

Accessories
for burners and igniters

Druckwächter
Pressure switches

Kugelhähne
Ball valves

Zündtrafos
Spark
transformers

Ventilprüfsysteme
Valve proving
systems

Druckwächter
Pressure switches

Sicherheitsabsperrventile
Safety shut-off valves

Flammenwächter, Feuerungsautomaten
Flame monitors, Burner controls

Zusammenschaltung von Brennern und Zündbrennern mit Zündtrafos und Steuergeräten
Connecting burners and igniters to spark transformers and control devices

Brenner/ Zündbrenner ionisationsüberwacht Burner/ igniter ionisation monitored	Zündtrafo Spark transformer	Flammenwächter Flame monitor	Steuergerät Control unit	Feuerungsautomat Burner control

ZGF, ZGU

AF 800 T 51

ZGP, ZG0 - ZG1
BGK0, BG0 - BG3

AF 800 T 10

D-GF 75

ZG2 - ZG5
BG4 - BG5

AF 700 T 20

oder Fremdgerät
or other make

ZT, BT

AAL 75/ AAC 75

zur Brenner-
steuerung
to burner control

oder Fremdgerät
or other make

ZAF, ZAU, ZA0
BAK0

ASD-75/ POI

ZDAF, ZDAU, ZDA0
BDAK0

oder direkt zur
Brennersteuerung
or directly to
burner control

ASD-75/ POD

ZA1 - ZA5
BA1 - BA5

ZDA1 - ZDA5
BDA1 - BDA5

oder direkt zur
Brennersteuerung
or directly to
burner control

BR, ZR
BD, ZD

direkt zur
Brennersteuerung
directly to
burner control

Legende/ Key

Netzkabel geschaltet
Mains cable switched

Flammen-
signalkabel
Flame signal
cable

Zündkabel
Ignition cable

Steuer- & Signalkabel
Control- & signal cable

Ionisations-Flammenwächter
Ionisation flame monitor
AAL 75
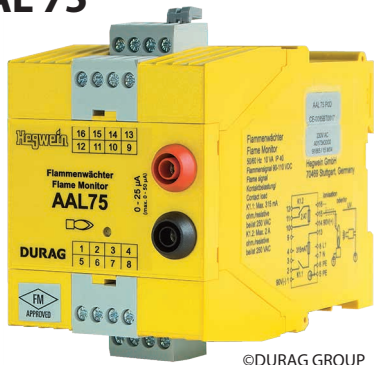
©DURAG GROUP

Betrieb	für intermittierenden Betrieb oder Dauerbetrieb, mit 1 potentialfreien Wechselkontakt
Betriebsspannung	115/ 125/ 230/ 250 VAC 50/ 60 Hz
Leistung	10 VA
Schutzart Gehäuse	IP40
Schutzart Klemmleiste	IP20
Flammensignalausgang	zwei potenzialfreie Schaltkontakte: max. 315 mA/ 250 VAC und max. 2 A/ 250 VAC
Signalkabellänge	max. 150 m
Gehäuse	Kunststoff
Einbau	in Schaltschrank auf 35 mm Hutprofilschiene nach IEC/ EN 60715
Geeignet für	Zünder und Brenner mit Ionisationselektrode/ Zünder und Brenner mit Zundtransformator und Ionisations-Flammenwachter (Hegwein)
Gewicht	ca. 550 g
Zul. Umgebungstemperatur	-20 °C bis +60 °C
FFDT (Sicherheitszeit)	≤ 1 s

operation	for intermittent or continuous operation, with 1 volt-free relay contact
supply voltage	115/ 125/ 230/ 250 VAC 50/ 60 Hz
power rating	10 VA
protection rating enclosure	IP40
protection rating terminal strip	IP20
flame signal output	two SPT contacts: max. 315 mA/ 250 VAC and max. 2 A/ 250 VAC
signal cable length	max. 150 m
housing	plastic
mounting	in control cabinet on 35 mm rails according to IEC/ EN 60715
suitable for	igniters and burners with flame rod/ igniters and burners with spark transformer and ionisation flame monitor (Hegwein)
weight	approx. 550 g
perm. ambient temperature	-20 °C to +60 °C
FFDT (safety time)	≤ 1 s

Ionisations-Flammenwächter mit Flammensignalwandler 4...20 mA
Ionisation flame monitor with flame signal converter 4...20 mA
AAC 75
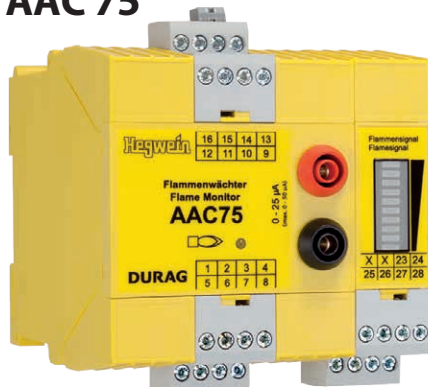
©DURAG GROUP

Ausführungen	AAC 75 P0D/... für intermittierenden Betrieb und Dauerbetrieb AAC 75 P0D/_G... Sonderausführung mit Goldkontakten
Betriebsspannung	230 V (-15 %/ +10 % bei 50/ 60 Hz) oder Sonderspannungen: 115 V/ 125 V/ 250 V
Leistung	10 VA
Umgebungstemperatur	-20 °C bis +60 °C
FFDT (Sicherheitszeit)	≤1 s
Anzeige	LED/ Bargraph (optional)
Schutzart Gehäuse	IP40
Schutzart Klemmleiste	IP20
Flammensignalausgang	zwei potentialfreie Schaltkontakte: max. 315 mA/ 250 VAC und max. 2 A/ 250 VAC
Signalkabellänge	max. 150 m
Gehäuse	Kunststoff
Einbau	in Schaltschrank auf 35 mm Hutprofilschiene nach IEC/ DIN 60715
Geeignet für	Zunder und Brenner mit Ionisationselektrode/ Zunder und Brenner mit Zundtransformator und Ionisations-Flammenwachter (Hegwein)
Gewicht	ca. 650 g
Flammensignalwandler	
Bürde	max. 120 Ohm (Ausgangssignal 4–20 mA)
Max. Ausgangssignal	21 mA

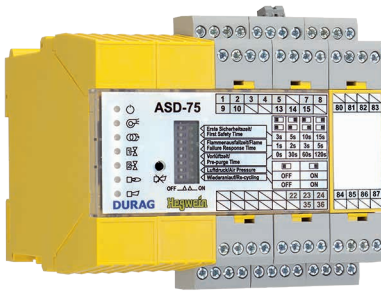| models	AAC 75 P0D/... for intermittent and continuous operation AAC 75 P0D/_G... special version with gold plated contacts
supply voltage	230 V (-15 %/ +10 % at 50/ 60 Hz) or special voltages: 115 V/ 125 V/ 250 V
power rating	10 VA
ambient temperature	-20 °C to + 60 °C
FFDT (safety time)	≤1 s
display	LED/ Bargraph (optional)
protection rating enclosure	IP40
protection rating terminal strip	IP20
flame signal output	two SPDT contacts: max. 315 mA/ 250 VAC and max. 2 A/ 250 VAC
signal cable length	max 150 m
housing	plastic
mounting	in control cabinet on 35 mm rails according to IEC/ EN 60715
suitable for	igniters and burners with flame rod/ igniters and burners with spark transformer and ionisation flame monitor (Hegwein)
weight	approx. 650 g
flame signal converter	
apparent ohmic load	120 ohm maximum (output signal 4-20 mA)
maximum output signal	21 mA

Flammenrelais
Flame relay
A 285 K 2.3

©DURAG GROUP

Betrieb	zur Einbindung in eine übergeordnete Brennersteuerung	operation	for integration into the main burner management system
Betriebsspannung	90 - 110 VDC	supply voltage	90 - 110 VDC
Schutzart	IP20	protection	IP20
Signalkabellänge	max. 150 m	signal cable length	max. 150 m
Einbau	in Schaltschrank auf 35 mm Hutprofilschiene nach IEC/ EN 60715	mounting	in control cabinet on 35 mm rails according to IEC/ EN 60715
Geeignet für	Zünder und Brenner mit Zündtrafo und Ionisations-Flammenwächter (Hegwein)	suitable for	igniters and burners with spark transformer and ionisation flame monitor (Hegwein)
Kontakte	2 potentialfreie Wechselkontakte, max. 250 VAC, 1 A ohmsche Last	contacts	2 volt-free change-over, max. 250 VAC, 1 A resistive load
Gewicht	ca. 170 g	weight	approx. 170 g
Zul. Umgebungstemperatur	-20 °C bis +60 °C	perm. ambient temperature	-20 °C to +60 °C

Feuerungsautomat
Burner control
ASD-75/ POI

©DURAG GROUP

Betriebsart	Intermittierender Betrieb	operational mode	intermittent operation
Netzspannung	115/ 230 VAC, 50/ 60 Hz	power supply	115/ 230 VAC, 50/ 60 Hz
Vorlüftzeit	0 s, 30 s, 60 s oder 120 s	prepurge time	0 s, 30 s, 60 s or 120 s
Erste Sicherheitszeit (Anlauf)	3 s, 5 s, 10 s oder 15 s	first safety time (start-up)	3 s, 5 s, 10 s or 15 s
FFRT (Flammenausfallzeit)	1 s, 2 s, 3 s oder 5 s	FFRT (flame failure response time)	1 s, 2 s, 3 s or 5 s
Flammenintensität	0…50 µA	flame intensity	0…50 µA
Zul. Umgebungstemperatur	-20 °C bis +60 °C	perm. ambient temperature	-20 °C to +60 °C
Installation	Hutschiene TS 35	installation	DIN-rail TS 35
Schutzart	IP20	protection	IP20
Anzeige	LED	display	LED
Gewicht	ca. 1 kg	weight	approx. 1 kg
Eingänge	externer Flammenwächter, 90-110 VDC Flammensignal	inputs	external flame monitor, 90-110 VDC flame signal
Länge Flammensignalkabel	max. 150 m	length of flame signal cable	max. 150 m
Abmessungen	113x103x118 mm (BxHxT)	dimensions	113x103x118 mm (wxhxd)

Feuerungsautomat
Burner control
ASD-75/ POD

©DURAG GROUP

Betriebsart	Dauerbetrieb	operational mode	continuous operation
Netzspannung	115/ 230 VAC, 50/ 60 Hz	power supply	115/ 230 VAC, 50/ 60 Hz
Vorlüftzeit	0 s, 30 s, 60 s oder 120 s	prepurge time	0 s, 30 s, 60 s or 120 s
Erste Sicherheitszeit (Anlauf)	3 s, 5 s, 10 s oder 15 s	first safety time (start-up)	3 s, 5 s, 10 s or 15 s
FFRT (Flammenausfallzeit)	1 s, 2 s, 3 s oder 5 s	FFRT (flame failure response time)	1 s, 2 s, 3 s or 5 s
Flammenintensität	0…50 µA	flame intensity	0…50 µA
Zul. Umgebungstemperatur	-20 °C bis +60 °C	perm. ambient temperature	-20 °C to +60 °C
Installation	Hutschiene TS 35	installation	DIN-rail TS 35
Schutzart	IP20	protection	IP20
Anzeige	LED	display	LED
Gewicht	ca. 1 kg	weight	approx. 1 kg
Eingänge	externer Flammenwächter, 90-110 VDC Flammensignal	inputs	external flame monitor, 90-110 VDC flame signal
Länge Flammensignalkabel	max. 150 m	length of flame signal cable	max. 150 m
Abmessungen	113x103x118 mm (BxHxT)	dimensions	113x103x118 mm (wxhxd)

Feuerungsautomat
## Burner control
D-GF 75

©DURAG GROUP

Betriebsart	D-GF 75-10: Intermittierender Betrieb, D-GF 75-20: Dauerbetrieb
Netzspannung	115/ 230 VAC, 50/ 60 Hz
Vorlüftzeit	0 s, 30 s, 60 s oder 120 s
Erste Sicherheitszeit (Anlauf)	3 s, 5 s, 10 s oder 15 s
FFRT (Flammenausfallzeit)	1 s, 2 s, 3 s oder 5 s
Flammenintensität	0…50 µA
Zul. Umgebungs-temperatur	-20 °C bis +60 °C
Installation	Hutschiene TS 35
Schutzart	IP20
Anzeige	LED
Gewicht	ca. 1 kg
Flammenfühler	externer Flammenwächter, Ionisationselektrode
Länge der Ionisationsleitung	max. 150 m (abgeschirmtes Kabel)
Abmessungen	91x103x118 mm (BxHxT)

operational mode	D-GF 75-10: intermittent operation D-GF 75-20: continuous operation
power supply	115/ 230 VAC, 50/ 60 Hz
prepurge time	0 s, 30 s, 60 s or 120 s
first safety time (start-up)	3 s, 5 s, 10 s or 15 s
FFRT (flame failure response time)	1 s, 2 s, 3 s or 5 s
flame intensity	0…50 µA
perm. ambient temperature	-20 °C to +60 °C
installation	DIN-rail TS 35
protection	IP20
display	LED
weight	approx. 1 kg
flame sensor	external flame monitor, ionisation electrode
length of ionisation cable	max. 150 m (shielded cable)
dimensions	91x103x118 mm (wxhxd)

Zündtrafos
Spark transformer
AF
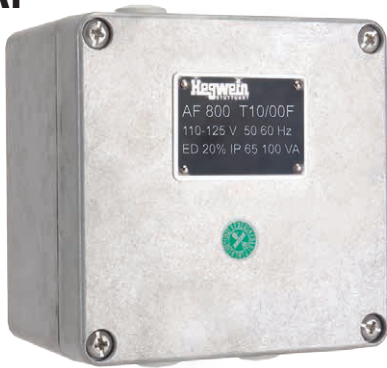
©DURAG GROUP

	AF 700 T 20	AF 800 T 10	AF 800 T 51	AF 900 T 10
Zündung ignition	Elektrode gegen Masse / electrode against ground			
Betriebsspannung supply voltage	standard: 220/ 230 VAC, 50/ 60 Hz / optional: 110/ 120 VAC, 50/ 60 Hz			
Gewicht weight	4 kg	1,9 kg	1,9 kg	3,5 kg
Zul. Umgebungs-temperatur perm. ambient temperature	-20 °C bis +60 °C für alle Varianten / -20 °C to +60 °C for all variants			
Leistung power rating	2x100 VA	100 VA	100 VA	100 VA
Zündung ignition	2x5 kV	5 kV	5 kV	5 kV
Einschaltdauer duty cycle	15 %	15 %	15 %	100 %
Schutzart protection	IP65	IP65	IP65	IP65
Maße L x B x H dimensions l x d x h	156x156x95 mm	122x122x94 mm	122x122x94 mm	156x156x95 mm
Gehäuse housing	GAI cast aluminum	GAI cast aluminum	GAI cast aluminum	GAI cast aluminum
Bemerkungen remarks	Zündung: Elektrode gegen Elektrode möglich Ignition: electrode against electrode possible		für 1-Elektroden-zünder for igniters with combined spark/ flame rod	

Druckwächter
Pressure switch
FD
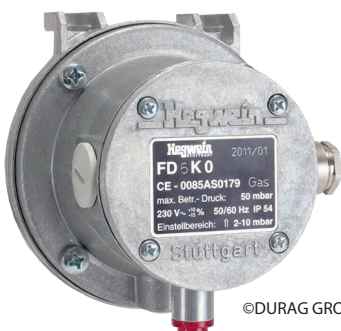
©DURAG GROUP

Betrieb	für Gase nach G 260 und Luft
Druckanschluss	Rp 1/4
Zul. Umgebungs-temperatur	0 °C bis +60 °C
Gewicht	750 g
Schutzart	IP54
Max. Betriebsdruck	FD...K0: 50 mbar, FD...K1 - 7: 300 mbar
Typ	**Eigenschaften**
FD 2 K 0	Grundtyp, Einstellbereich 2–10 mbar
FD 6 K 0	mit roter Signallampe
FD 8 K 0	mit grüner Signallampe
FD 2 K 1-7	Grundtyp, Einstellbereich 5–70 mbar
FD 6 K 1-7	mit roter Signallampe
FD 8 K 1-7	mit grüner Signallampe

operation	for gases according to DVGW-data sheet G 260 and air
gas port	Rp 1/4
perm. ambient temperature	0 °C to +60 °C
weight	750 g
protection	IP54
max. operating pressure	FD...K0: 50 mbar, FD...K1 - 7: 300 mbar
type	**features**
FD 2 K 0	basic type, setting range 2–10 mbarg
FD 6 K 0	with red indicator lamp
FD 8 K 0	with green indicator lamp
FD 2 K 1-7	basic type, setting range 5–70 mbarg
FD 6 K 1-7	with red indicator lamp
FD 8 K 1-7	with green indicator lamp

Ventilprüfsysteme
Valve proving systems
AD
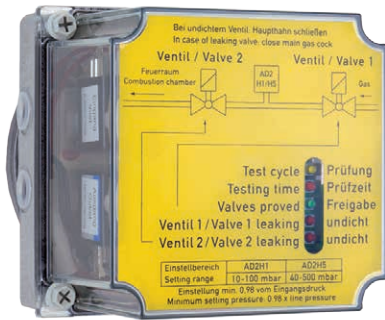
©DURAG GROUP

für Gase nach G 260
Anwendung

Vor jedem Brennerstart oder nach jeder Brennerabschaltung wird eine Überprüfung von 2 Gas-Sicherheitsabsperrventilen auf Dichtheit durchgeführt.

for gases according to DVGW-data sheet G 260
Application

Two gas safety shut-off valves are checked for their tightness prior to every burner start-up or after every shut-down.

Lieferbare Typen available versions	AD 2 H 1		AD 2 H 5	
Betriebsdruck max. operating pressure	100 mbar 100 mbarg		500 mbar 500 mbarg	
Betriebsspannung supply voltage	standard: optional:	115 VAC, 230 VAC 24 VDC	standard: optional:	115 VAC, 230 VAC 24 VDC
Temperatur temperature	0 °C bis +60 °C 0 °C to +60 °C		0 °C bis +60 °C 0 °C to +60 °C	
Schutzart protection	IP54		IP54	
Einstellbereich setting range	10 – 100 mbar 10 – 100 mbarg		40 – 500 mbar 40 – 500 mbarg	
Prüfzeit testing time	1 – 130 s		1 – 130 s	
Zul. Umgebungs- temperatur perm. ambient temperature	-10 °C bis +60 °C -10 °C to +60 °C		-10 °C bis +60 °C -10 °C to +60 °C	
Gasanschluss gas port	Rp 1/4		Rp 1/4	

Manometer
Pressure gauge
S2610

©DURAG GROUP

Digital anzeigendes Messgerät

Batteriebetriebenes, handliches Messgerät mit elektronischem Sensor für Druck und Differenzdruck. Unempfindlich gegen Staub und Feuchtigkeit. Besonders geeignet für die Inbetriebnahme und Wartung von Brennern und Zündbrennern sowie zur Differenzdruck-messung an Luftfiltern

Measuring device with digital readout

Battery operated, handy unit with electronic sensor for pressure and differential pressure. Impervious to dust and moisture. Ideally suited for the commissioning and maintenance of burners and igniters and to pick up the pressure loss of air filters

Bedienung	Folientastatur
Nullpunkt	einstellbar
Messbereich	0 – 1000 mbar
Überdrucksicherheit	bis 3 bar

handling	foil covered keyboard
zero-adjustment	manually
range	0 – 1000 mbarg
pressure resistance	max. 3 barg

µ-Amperemeter
µ-Ammeter
MA 0-50

©DURAG GROUP

Anwendung	Gleichstrom-Amperemeter zur Messung des Flammensignals
Messbereich	0 - 50 µA
Sicherung	32 mA (F)
Kabellänge	1 m
Kabelanschluss	Labor-Messleitung
Kabelquerschnitt	1 mm²
Steckverbindergröße	4 mm

application	DC-ammeter to measure the flame signal
measuring range	0 - 50 µA
fuse	32 mA (quick-blowing)
cable length	1 m
cable connection	laboratory plug
wire gauge	1 mm²
plug size	4 mm

Kugelhähne
Ball valves
Z 845 Z

©DURAG GROUP

Anwendung	Zur Einstellung des Gas-Volumenstroms bei Brennern und Zünd-brennern Nur mit Werkzeug verstellbar
Gehäuse	MS 58
Anschluss	Innen-/ Außengewinde
Typ	**Anschluss**
Z 845 Z 1	1/4"
Z 845 Z 2	3/8"
Z 845 Z 3	1/2"
Z 845 Z 4	3/4"
Z 845 Z 5	1"

application	to adjust the gas flow of burners and igniters tool required for adjustment
body	brass
connection threads	male/ female
type	**connection**
Z 845 Z 1	1/4"
Z 845 Z 2	3/8"
Z 845 Z 3	1/2"
Z 845 Z 4	3/4"
Z 845 Z 5	1"

Luftreguliermuffen
Air regulating sleeves
Z 945 Z

©DURAG GROUP

Anwendung	Zur Einstellung des Luft-Volumenstroms bei Brennern und Zündbrennern, nur mit Werkzeug verstellbar Einstellkegel arretierbar, nur mit Werkzeug verstellbar
Gehäuse	Temperguss verzinkt
Anschluss	beidseitig Innengewinde
Typ	**Anschluss**
Z 945 Z 1	Rp ¾
Z 945 Z 2	Rp 1
Z 945 Z 3	Rp 1½
Z 945 Z 6	Rp 2
Zubehör	T1K1 Reguliermuffenschlüssel

application	to adjust the air flow of burners and igniters tool required for adjustment adjustment cone can be locked
body	malleable cast iron, galvanized
connection threads	female/ female
type	**connection**
Z 945 Z 1	Rp ¾
Z 945 Z 2	Rp 1
Z 945 Z 3	Rp 1½
Z 945 Z 6	Rp 2
accessories	T1K1 regulating sleeve key

Doppelnippel
Double nipple
Z 946 F
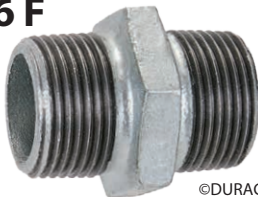
©DURAG GROUP

Anwendung	Für den direkten Anbau der Luftreguliermuffe an den Brennern und Zünbrennern
Gehäuse	Temperguss verzinkt
Typ	**Anschluss**
Z 946 F 2	R ¾
Z 946 F 3	R 1
Z 946 F 4	R 1½
Z 946 F 10	R 2

application	to mount the air regulating sleeve to the burner or igniter
body	malleable cast iron, galvanized
type	**connection**
Z 946 F 2	R ¾
Z 946 F 3	R 1
Z 946 F 4	R 1½
Z 946 F 10	R 2

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

VEREWA
A Brand of
DURAG GmbH

DURAG process & systems technology
A Brand of
DURAG GmbH

DURAG data systems

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

UTAS DR LASINGER
A Brand of
DURAG data systems GmbH
Branch Office Austria
Lastenstraße 36, City Tower 2
4020 Linz, Austria
Tel. +43 732 60 99 60-0
Fax +43 732 60 99 60-4
E-Mail: office@utas.at

DURAG SIENA
DURAG Siena do Brasil Ltda
Rua Vinte e Dois de Agosto, 66
Diadema - SP
09941-530 Brazil
Tel.   +55 11 4071-5050 r.28
Fax +55 11 4077-1718
E-Mail: info@duragsiena.com.br

Hegwein
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
SMITSVONK Holland B.V.
P.O. Box 180, 2700 AD Zoetermeer
Goudstraat 6, 2718 RC Zoetermeer
Netherlands
Tel. +31 79 361 35 33
Fax +31 79 361 13 78
E-Mail: sales@smitsvonk.nl

GRIMM
GRIMM Aerosol Technik
GmbH & Co. KG
Dorfstraße 9
83404 Ainring, Germany
Tel. +49 8654 578-0
Fax +49 8654 578-35
E-Mail: info@grimm-aerosol.com

DURAG GROUP SALES

DURAG Sales and Marketing
GmbH & Co. KG
Kollaustraße 105
22453 Hamburg, Germany
Tel. +49 40 55 42 18-0
Fax +49 40 58 41 54
E-Mail: info@durag.de

DURAG Brazil
DURAG Siena do Brasil Ltda
Rua Vinte e Dois de Agosto, 66
Diadema - SP
09941-530 Brazil
Tel. +55 11 4071-5050 r.28
Fax +55 11 4077-1718
E-Mail: info@duragsiena.com.br

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, 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
Private Limited
#27/30, 2nd Main Road
Industrial Town, Rajajinagar
Bengaluru 560 044, India
Tel. +91 80 2314 5626, 2301 1700
Fax +91 80 2314 5627
E-Mail: info@duragindia.com

DURAG Instrumentation
(Shanghai) Co., Ltd.
Room 706, Dibao Plaza, No. 3998
Hongxin Rd., Minhang District
Shanghai, 201103 PR China
Tel. +86 21 60732979-200
Fax +86 21 60732980-205
E-Mail: info@durag-cn.com

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

DURAG Middle East (Branch)
Dubai Airport Free Zone
5 West Wing, Office 124
Dubai, UAE
P.O. Box 371555
Tel. +971 4260251 0
E-Mail: dme@durag.de

DURAG RUSS OOO
Andropova avenue 18/6
Office 5-09
115432 Moscow
Russia
Tel. +7 499 4180090
Fax +7 499 4180091
E-Mail: info@durag-group.ru

DURAG UK GmbH
Lullington House, Ashby Road
Burton-on-Trent, Staffordshire
DE15 0YZ
Great Britain
Tel. +44 1283 553 481
Fax +44 1785 760 014
E-Mail: durag.uk@durag.de

DURAG Branch North
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 Branch East
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 Branch South
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 Branch 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

www.durag.de

D-UG 120

DURAG

Control unit

Self-monitoring and fail-safe control unit for monitoring gas, oil and coal flames with DURAG UV, UV+IR or IR flame sensors, primarily in single burner view applications
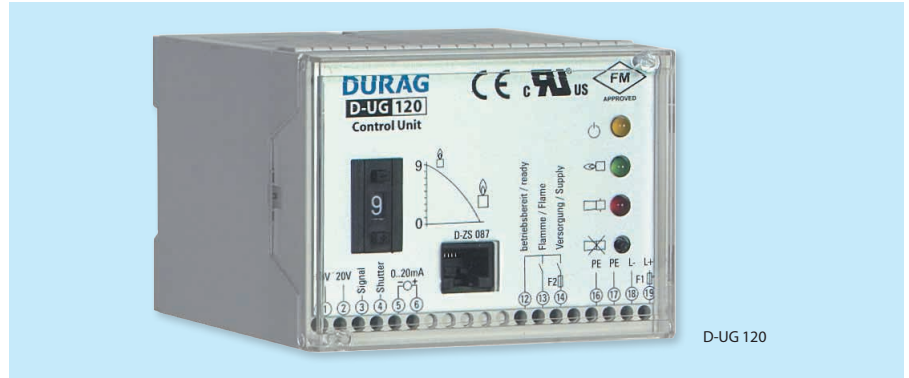

D-UG 120

Features

- Suitable for intermittent operation as well as continuous operation
- LED display
- Installation on DIN-rail

Applications

- Power stations
- Chemical industry
- Refineries
- Cement plants
- Waste incinerators
- Steam generators
- Heating plants

Certifications

- DVGW
- UL 372
- FM Class 7610
- EAC
- SIL3

Functional description

The D-UG 120 control unit analyses the flame radiation via the signal of the flame sensor connected.
The easy-to-read LED display shows the operational status of the flame monitor.
The flame intensity is present as a current at an output 0/4 ... 20 mA for further analysis.

Flame sensors

- D-LE 103 for standard applications
- D-LE 603 for selective flame monitoring
- D-LE 701/703 for special applications (fibre optics)
- D-GT 800 for particularly harsh environments
- Sensors for Ex-applications are also available

Design

- Enclosure for DIN-rail mounting

Accessories

- **Power supply unit** for connecting the D-UG 120 to 230VAC (D-NG 24/05)
- **Digital display** for optimal adjustment of the flame sensors by measuring the pulse rate and its extreme values (D-ZS 087 - 20)
- **Optical adjustment aid** for the alignment of the swivel mount on the sighting tube (D-ZS 118)
- **UV-C test light source** 230 V/ 50 Hz (D-ZS 077-10)
- **UV-A, UV-B and IR test light source** 230 V/ 50 Hz (D-ZS 093)
- **Swivel mount** for alignment of flame monitor to the flame to be monitored
- **Thermal isolator** with electrical insulation
- **Ball valve** for closing sighting tube
- **Terminal box** for connecting flame monitor (D-ZS 140/ 141)

Mains adapter D-NG 24/05 (optional) | Control unit D-UG 120 | Flame sensor e.g. D-LE 103 | Purge air flange | Thermal isolator with electrical insulation D-ZS 117 I (optional) | Ball valve D-ZS 133 I (optional) | Swivel mount D-ZS-033 I (optional)

Digital display D-ZS 087-20 (optional)

Operation mode	Intermittent operation, continuous operation, 72-hour operation without permanent supervision	**Configurable switching thresholds**	1
Safety	Self-monitoring and fail-safe	**Threshold setting**	0 ... 9
Electrical connection	24 VDC, 5 W, PELV	**Flame sensor**	1
Protection	IP20	**Display**	LED
Flame relay	1x NO contact, 230 VAC, 2 A	**Flame intensity**	0/4 ... 20 mA
Status relay	1x NO contact, 230 VAC, 2 A	**Perm. ambient temperature**	-20 °C to +60 °C
Installation	TS 35 DIN-rail	**Dimensions**	100x75x118 mm (WxHxD)
FFDT (safety time)	1 s	**Weight**	approx. 0.45 kg

DURAG

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

SIL 3 certified

(1)

Compact flame monitor D-LX 200

Selective and failsafe flame monitoring combined with high availability

Basic version for safe zones

Ex-version for zone 2 & 22

©DURAG GROUP

©DURAG GROUP

Flexibility

The D-LX 200 is a compact flame monitor for the monitoring of industrial flames in continuous operation. Through different sensors the models reliably detect flames of all fuels, especially gas, oil, coal, biomass, waste as well as flames of the most variable combustion techniques (low NOx, recirculation mode, dual-purpose burners).

The flickering of the flame radiation is analysed for its frequency and intensity. In doing so, the device continuously and automatically adjusts the amplification to the signal strength of the flame – this ensures a wide dynamic range.

Thresholds for flame intensity as well as flame flicker frequency and further parameters can be selected differently for two ranges. This makes the D-LX 200 ideally suited for operation in plants with multiple burners and complex process sequences.

Permitted ambient temperatures from -40 °C up to +85 °C enable the flexibility to make use of this performance in all regions of the world.

Certifications (depending on version)

Dual channel design
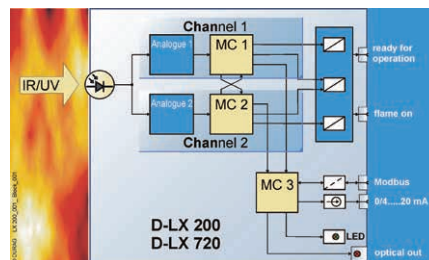
Block diagram D-LX 200

Safety and availability

The D-LX 200 is failsafe and self-monitoring. It conforms to the standards for continuous mode operation worldwide.

With its consequent dual channel design the D-LX 200 became the first flame monitor to receive a complete SIL3 certification according to EN 61508. This is achieved with a

Cement plant

Waste incinerators

Power plant

hardware failure tolerance (HFT) of 1, which is determined by superior system architecture, enabling highest safety together with high availability. This facilitates integration into safety chains within the framework of Functional Safety.

Communication

- Important signals and parameters can be observed directly on the device during operation via LEDs and switch settings
- The flame monitor settings and the flame signal can be checked locally or remotely
- Standard communication interfaces: Modbus RTU (RS485) or IrDA
- Integration of up to 64 flame monitors per Modbus (daisy chain)

Optional software solutions

- D-LX 200 InformationCentre for the recording of the flame signal and parameters as ideal complement for the commissioning of up to six flame monitors simultaneously
- D-IAS 2010 AX with integrated D-LX 200 OperationCentre for long time recording of the flame signals and parameters of up to 48 flame monitors – remote access via web browser with customary tablets or PCs possible

Diversity and compatibility

- All models of the D-LX 200 are available as type D-LX 720 for the use with flexible or rigid fibre optic systems – for example for tilting burners or rotary kilns
- Connection cables can be either preinstalled or are available with a robust metal plug connector (/MP3)
- Certified versions for gas and dust explosive environments compliant to ATEX or NEC
- Variants with numerous different local certifications
- Simple retrofitting: The connection flange is compatible to standard installations of the devices D-LE 603 and D-LX 100

Additional components and equipment

- Comprehensive installation accessory like swivel mounts, adapters, valves and heat insulators
- Orifice plates of different sizes, mountable without tools, for very intensive flames
- D-LX 200 Test Kit for software supported tests of the device including printed output of protocols
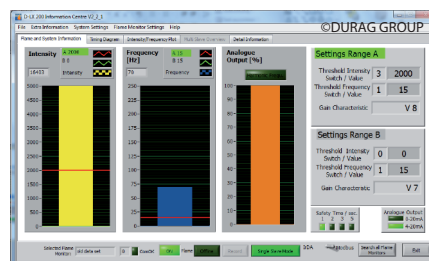
Applications

- Chemical industry
- Refineries
- Cement plants
- Waste incinerators
- Power plants
- Steam generators
- Claus plants

Technical data

Spectral sensitivity	...UAF 280 – 410 nm ...UA 190 – 520 nm ...IG 780 – 1800 nm
Operating voltage	24 VDC ±20 %
Power consumption	5 W
Ambient temperature	-40 °C up to +85 °C; /86Ex, /87Ex: -40 °C up to +65 °C
FFDT	1, 2, 3, 5 s
Flame relay contact	1x closing contact 24 VDC, 0,5 A
Status relay contact	1x closing contact 24 VDC, 0,5 A
Analogue output	0/4 … 20 mA, max. load 750 Ohm
Protection	IP66/ IP68 IP65 (/MP3) IP66 (Ex-versions)
Sighting tube connection	G1¼" or NPT1¼" F
Purge air connection	G½" or NPT ½" F
Viewing angle	6°
Dimensions	Standard 85x85 mm, length appr. 250 mm /8xEx Ø120 mm, length appr. 310 mm
Weight	Standard appr. 1,25 kg ../8xEx appr. 3,2 kg

©DURAG GROUP

Software D-LX 200 InformationCentre

©DURAG GROUP

(5)
Refineries

(6)
Steel industry

(7)
Marine

DURAG

D-LX 201
Compact flame monitor

Safe, flexible and selective flame monitoring –
for sure

DURAG

D-LX 201 Compact flame monitor
Safe, flexible and selective flame monitoring – for sure

Optical flame monitoring

For large industrial combustion plants with many burners, complex process sequences or even several fuels the method of optical flame monitoring often is the most adequate one. It offers a way of monitoring that on one hand is burner selective as well as fuel selective, on the other hand can be adapted well to very variable combustion conditions.

To monitor the flame the device evaluates electromagnetic radiation in the ultraviolet, visible and infrared region of the spectrum for its flame specific portions and analyses these in more detail. For this the D-LX 201 investigates intensity and frequency of the flame flickering as well as the stability of the flame.

As a safety device the D-LX 201 is built fail safe and self-monitoring. Through its design as a compact flame monitor it possesses a direct relay output for the flame signal. But as a modern flame monitor it also provides additional information about the flame via adequate bus systems.

Images on the right:
Examples of the housing variants used for the product family D-LX 201 (from the top):

– Housing P2 (shown with plug connector)
– Housing M5 (shown with plug connector)
– Housing M4 (version for Ex zone 1/21)

Image below:
– Optical coupling for the D-LX 721, housing P2

Housing variants

### Certifications (according to variant)

Facts + Specifications

Spectral sensitivity	UAF: 280 … 410 nm UA: 190 … 520 nm IG: 780 … 1800 nm
Electrical connection	24 V ⎓, 5 W, PELV
Ambient temperature	−40 °C … +85 °C; /86Ex, /87Ex: −40 °C … +65 °C
FFDT (safety time)	1, 2, 3, 5 s (separately per Range)
Relay outputs	Flame relay Ready for operation relay Closing contacts, 24 V⎓, 0,5 A
Analogue output (signal configurable)	0/4 … 20 mA, 750 Ohm max.
Optional real time information	Flame stability analysis
Ingress Protection	IP66/IP68 IP65 (/MP3) IP66 (Ex-versions)
Process connection	G1¼" or NPT1¼", F
Purge air connection	G½" or NPT ½", F
Viewing angle	6°
Dimensions	Hsg. P2 80 x 80 x 250 mm Hsg. M5 100 x 100 x 260 mm Hsg. M4 Ø120 mm Length approx. 310 mm
Weight (w/o cable)	Housing P2 approx. 0,9 kg Housing M5 approx. 1,2 kg Housing M4 approx. 2,8 kg

▶ Applicable from -40°C up to +85°C, certified and without need for accessories to isolate, heat or cool

▶ Wide dynamic range through automatic adaptation to the brightness of the flame

▶ Consequent two channel architecture for highest safety coexisting with highest availability

▶ Ideal support for Functional Safety within safety chains up to SIL3

▶ Different variants certified for diverse systems of standards for many parts of the world and many fields of application

▶ All variants also available for use with fibre optic systems (designation D-LX 721)

▶ Local display of status parameters and flame intensity at the device, for the whole temperature range

▶ Low maintenance requirements

▶ Optional analysis of flame stability in real time
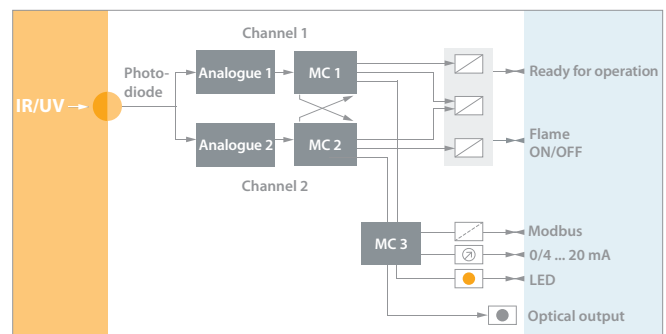
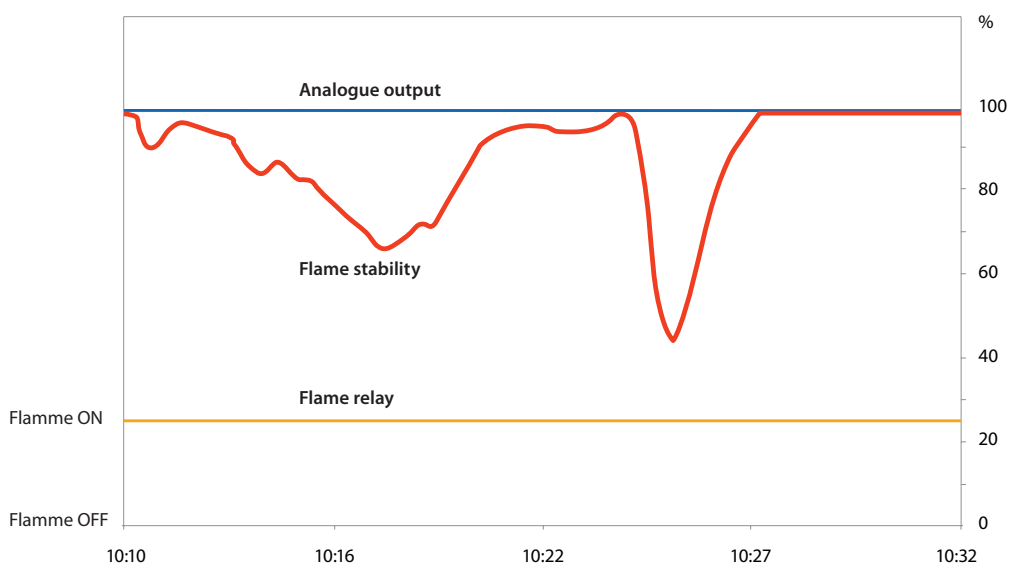Two channel design for high safety with high availability

Features + benefits

▶ **Safe process control**
Even during strong and fast load changes of the combustion plant the process can be controlled safely by the flame stability signal. Reactions in due time are possible.

▶ **Higher flexibility for different loads and different fuels**
Excellent selective flame monitoring and information concerning the stability of the flame makes it possible to run the plant in less stable regimes

▶ **Protection from unscheduled shutdown of the burner**
Burner specific information concerning the stability allows decisions for preventative maintenance of the burner

▶ **Fulfilment of special requirements**
Flexible pre-settings for different combustion situations and fuels

▶ **Same technology for the most variable application conditions**
The same device technology can be used without change for the most different geographical regions and based on varying systems of standards

Applications

▶ Complex combustion plants with a larger number of burners

▶ Combustion processes with continuous operation and with changing fuels

▶ Fossil fuelled power plants (Lignite, hard coal, biomass, oil and gas)

▶ Thermoprocessing plants

▶ Chemical plants

▶ Refineries

▶ Waste incineration plants

▶ Petrochemical plants

▶ Steel industry

Temporal variation of the usual output signals **Flame relay** and **Analogue output**, as well as the **Flame stability signal** for a real combustion. The signal for the flame stability shows very clear changes while the other two signal do not yet show signs of a change.

Branch offices Sales and Service

**DURAG Sales + Service
GmbH & Co. KG**
Kollaustraße 105
22453 Hamburg, Germany
Tel. +49 40 55 42 18-0
Fax +49 40 58 41 54
info@durag.de

DURAG Branch East
Halsbrücker Straße 34
09599 Freiberg, Germany
Tel. +49 3731 30 04-0
Fax +49 3731 30 04-22
durag-ost@durag.de

DURAG Branch North
Kollaustraße 105
22453 Hamburg, Germany
Tel. +49 40 55 42 18-0
Fax +49 40 58 41 54
durag-nord@durag.de

DURAG Branch South
Weidenweg 16
73087 Bad Boll, Germany
Tel. +49 7164 912 25-0
Fax +49 7164 912 25-50
durag-sued@durag.de

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

DURAG Brazil
DURAG Siena do Brasil Ltda
Rua Vinte e Dois de Agosto, 66
Diadema - SP
09941-530 Brazil
Tel. +55 11 4071-5050 r.28
Fax +55 11 4077-1718
info@duragsiena.com.br

DURAG France S. a. r. l.
147 avenue Paul Doumer
92500 Rueil Malmaison, France
Tel. +33 1 41 29 04 60
Fax +33 1 41 29 04 68
info@durag-france.fr

DURAG Inc.
1355 Mendota Heights Road
Suite 200
Mendota Heights
MN 55120, USA
Tel. +1 651 451-1710
Fax +1 651 457-7684
Toll Fee: 800 811 98 52
durag@durag.com

DURAG Inc. (Houston Branch)
440 Cobia Drive
Suite 1104 (building #11)
Katy, TX 77494
Tel. +1 832 437 3173
Fax +1 832 437 8272
Toll Fee: 800 811 98 52
durag@durag.com

**DURAG India Instrumentation
Private Limited**
#27/30, 2nd Main Road
Industrial Town, Rajajinagar
Bengaluru 560 044, India
Tel. +91 80 2314 5626, 2301 1700
Fax +91 80 2314 5627
info@duragindia.com

**DURAG Instrumentation
(Shanghai) Co., Ltd.**
Room 706, Dibao Plaza, No. 3998
Hongxin Rd., Minhang District
Shanghai, 201103 PR China
Tel. +86 21 60732979-200
Fax +86 21 60732980-205
info@durag-cn.com

DURAG Italia S. r. l.
Via Carlo Panseri, 118
CIM uffici, P. secondo
28100 Novara, Italy
Tel. +39 0321 679569
Fax +39 0321 474165
info@durag.it

DURAG Japan Office
c/o TMS Planning Inc.
291-2 Umena, Mishima-shi
Shizuoka-ken
411-0816 Japan
Tel. +81 55 977 3994
Fax +81 55 977 3994
info@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
info@durag-group.co.kr

DURAG Middle East (Branch)
Dubai Airport Free Zone
5 West Wing, Office 124
Dubai, UAE
P.O. Box 371555
Tel. +971 4260251 0
dme@durag.de

DURAG RUSS OOO
Andropova avenue 18/6
Office 5-09
115432 Moscow, Russia
Tel. +7 499 4180090
Fax +7 499 4180091
info@durag-group.ru

DURAG UK GmbH
Bretby Business Park, Ashby Road
Burton-on-Trent, Staffordshire
DE15 0YZ, Great Britain
Tel. +44 1283 553 481
Fax +44 1283 553 482
durag.uk@durag.de

www.durag.com

DURAG

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

VEREWA

**VEREWA –
A brand of DURAG GmbH**
Kollaustraße 105
22453 Hamburg, Germany
Tel. +49 40 55 42 18-0
Fax +49 40 58 41 54
verewa@durag.de

DURAG process & systems technology

**DURAG
process & systems technology –
A brand of DURAG GmbH**
Kollaustraße 105
22453 Hamburg, Germany
Tel. +49 40 55 42 18-0
Fax +49 40 58 41 54
info@durag-process.de

DURAG data systems

DURAG data systems GmbH
Kollaustraße 105
22453 Hamburg, Germany
Tel. +49 40 55 42 18-3000
Fax +49 40 55 42 18-3099
info@durag-data.com

UTAS DR LASINGER

**UTAS – DR. LASINGER
A brand of DURAG data systems
GmbH**
Branch Office Austria
Lastenstraße 36, City Tower 2
4020 Linz, Austria
Tel. +43 732 60 99 60-0
Fax +43 732 60 99 60-4
office@utas.at

Hegwein

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

SMITSVONK

SMITSVONK Holland B.V.
P.O. Box 180, 2700 AD Zoetermeer
Goudstraat 6, 2718 RC Zoetermeer
Netherlands
Tel. +31 79 361 35 33
Fax +31 79 361 13 78
sales@smitsvonk.nl

DURAG SIENA

DURAG Siena do Brasil Ltda
Rua Vinte e Dois de Agosto, 66
Diadema - SP
09941-530 Brazil
Tel. +55 11 4071-5050 r.28
Fax +55 11 4077-1718
info@duragsiena.com.br

GRIMM

**GRIMM Aerosol Technik
GmbH & Co. KG**
Dorfstraße 9
83404 Ainring, Germany
Tel. +49 8654 578-0
Fax +49 8654 578-35
info@grimm-aerosol.com

D-LX 110
Compact flame monitor
Easy, versatile and flexible

D-LX 110 Compact flame monitor
Easy, versatile and flexible

Optical flame monitoring

For industrial combustion plants with complex process
sequences or several fuels the method of optical flame
monitoring often is the most adequate one. It offers a
way of monitoring that on one hand is burner selective
as well as fuel selective, on the other hand can be
adapted well to very variable combustion conditions.

To monitor the flame the device evaluates electro-
magnetic radiation in the ultraviolet, visible or infrared
region of the spectrum for its flame specific portions
and analyses these in more detail. For this the D-LX 110
investigates the intensity of the flame flickering or of
the radiation in the short wavelength range in order to
distinguish the signal from the background radiation of
the hot fixtures within the chamber.

As a safety device the D-LX 110 is built fail safe and
self-monitoring. Through its design as a compact flame
monitor it possesses two direct relay outputs for the
flame signal. As a modern flame monitor it allows for
flexible adjustment to the local combustion conditions.

Housing variants

Images:
Example of the housing variant used
for the product family D-LX 110:

– Housing M5 (shown with plug connector)

Certifications (according to variant)

Facts + Specifications

Spectral sensitivity	UL: 185 … 260 nm UAF: 280 … 410 nm UA: 190 … 520 nm IS: 300 … 1100 nm IG: 780 … 1800 nm
Electrical connection	24 V⎓, 7 W, PELV
Ambient temperature	−40 °C … +75 °C; Version UL: −40 °C … +70 °C
FFDT (safety time)	0.5 … 5 s (in steps of 0.5 s)
Flame contacts	Normally open contact: active when flame ON Normally closed contact: active when flame OFF
Ready for operation contact	Normally open contact: active when no fault
Switching capacity relay contacts	Max. 24 V⎓, 0.5 A Max. 250 V~, 2.0 A at 250 V/cos φ = 1.0
Analogue output (selectable)	0/4 … 20 mA, Load max. 750 Ohm
Protection type	IP66/IP68 IP65 (/MP7)
Process connection	G1¼" or NPT1¼", F
Purge air connection	G½" or NPT ½", F
Viewing angle	6° 6° hor., 12° vert. (D-LX 110 UL)
Dimensions	Hsg. M5 100 x 100 x 260 mm
Weight (w/o cable)	Housing M5 approx. 1.3 kg

▶ Applicable from −40°C up to +75/70 °C, certified and without need for accessories to isolate, heat or cool

▶ Two channel control unit module for highest safety coexisting with highest availability

▶ Ideal support for Functional Safety within safety chains up to SIL3

▶ Different variants certified for diverse systems of standards for many parts of the world and many fields of application

▶ Two contacts for the flame signal (NO and NC)

▶ All variants also available for use with fibre optic systems (designation D-LX 710), also the Ex versions

▶ Easy exchange of consumable parts

▶ Low maintenance requirements

▶ Local display of settings and operational status for the whole ambient temperature range, visible for all versions at a single glance
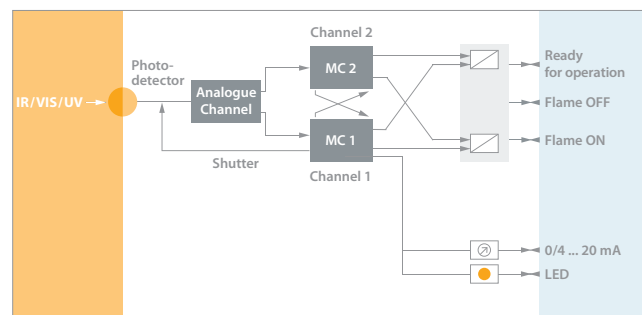
Functional diagram of D-LX 110/710.
The two channel design characteristic for DURAG flame monitors is visible.

Features + benefits

▶ **Easy adjustment**
The easy access to the available adjustments shortens time needed for commissioning

▶ **Versatile detection**
The choice of available detectors allows for the monitoring of flames of all fuels within the same device family

▶ **Versatile for the most variable application conditions**
The same device technology can be used without change for the most different geographical regions and based on varying systems of standards

▶ **Flexible for changed requirerements**
If the requirements of the plant change (Ex zones, need for fibre optic systems) it usually is possible to adapt via a replacement within the same device family

▶ **Flexible operation support**
The possibility to adapt device settings also outside the factory enables fast local replacements with smaller stocks of replacement devices

Applications

▶ Simple combustion plants with single burners or optically separated burners

▶ Combustion processes with continuous operation

▶ Thermal processing plants

▶ Chemical plants

▶ Refineries

▶ Waste incineration plants

▶ Petrochemical plants

▶ Steel industry

Branch offices Sales and Service

**DURAG Sales + Service
GmbH & Co. KG**
Kollaustraße 105
22453 Hamburg, Germany
Tel. +49 40 55 42 18-0
Fax +49 40 58 41 54
info@durag.de

DURAG Branch East
Halsbrücker Straße 34
09599 Freiberg, Germany
Tel. +49 3731 30 04-0
Fax +49 3731 30 04-22
durag-ost@durag.de

DURAG Branch North
Kollaustraße 105
22453 Hamburg, Germany
Tel. +49 40 55 42 18-0
Fax +49 40 58 41 54
durag-nord@durag.de

DURAG Branch South
Weidenweg 16
73087 Bad Boll, Germany
Tel. +49 7164 912 25-0
Fax +49 7164 912 25-50
durag-sued@durag.de

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

DURAG Brazil
DURAG Siena do Brasil Ltda
Rua Vinte e Dois de Agosto, 66
Diadema - SP
09941-530 Brazil
Tel. +55 11 4071-5050 r.28
Fax +55 11 4077-1718
info@duragsiena.com.br

DURAG France S. a. r. l.
147 avenue Paul Doumer
92500 Rueil Malmaison, France
Tel. +33 1 41 29 04 60
Fax +33 1 41 29 04 68
info@durag-france.fr

DURAG Inc.
1355 Mendota Heights Road
Suite 200
Mendota Heights
MN 55120, USA
Tel. +1 651 451-1710
Fax +1 651 457-7684
Toll Fee: 800 811 98 52
durag@durag.com

DURAG Inc. (Houston Branch)
440 Cobia Drive
Suite 1104 (building #11)
Katy, TX 77494
Tel. +1 832 437 3173
Fax +1 832 437 8272
Toll Fee: 800 811 98 52
durag@durag.com

**DURAG India Instrumentation
Private Limited**
#27/30, 2nd Main Road
Industrial Town, Rajajinagar
Bengaluru 560 044, India
Tel. +91 80 2314 5626, 2301 1700
Fax +91 80 2314 5627
info@duragindia.com

**DURAG Instrumentation
(Shanghai) Co., Ltd.**
Room 706, Dibao Plaza, No. 3998
Hongxin Rd., Minhang District
Shanghai, 201103 PR China
Tel. +86 21 60732979-200
Fax +86 21 60732980-205
info@durag-cn.com

DURAG Italia S. r. l.
Via Carlo Panseri, 118
CIM uffici, P. secondo
28100 Novara, Italy
Tel. +39 0321 679569
Fax +39 0321 474165
info@durag.it

DURAG Japan Office
c/o TMS Planning Inc.
291-2 Umena, Mishima-shi
Shizuoka-ken
411-0816 Japan
Tel. +81 55 977 3994
Fax +81 55 977 3994
info@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
info@durag-group.co.kr

DURAG Middle East Rep. Office
Office Number LB190507
5th Floor, Jafza View 19
Jebel Ali Free Zone
Tel. +971 488683-30
Dubai, United Arab Emirates
dme@durag.com

DURAG SEA Pte. Ltd.
25 International Business Park
#4–06 German Centre
Singapore 609916
info@durag.de

DURAG UK GmbH
Bretby Business Park, Ashby Road
Burton-on-Trent, Staffordshire
DE15 0YZ, Great Britain
Tel. +44 1283 553 481
Fax +44 1283 553 482
durag.uk@durag.de

DURAG

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

VEREWA

**VEREWA –
A brand of DURAG GmbH**
Kollaustraße 105
22453 Hamburg, Germany
Tel. +49 40 55 42 18-0
Fax +49 40 58 41 54
verewa@durag.de

DURAG process & systems technology

**DURAG
process & systems technology –
A brand of DURAG GmbH**
Kollaustraße 105
22453 Hamburg, Germany
Tel. +49 40 55 42 18-0
Fax +49 40 58 41 54
info@durag-process.de

DURAG data systems

DURAG data systems GmbH
Kollaustraße 105
22453 Hamburg, Germany
Tel. +49 40 55 42 18-3000
Fax +49 40 55 42 18-3099
info@durag-data.com

UTAS DR. LASINGER

**UTAS – DR. LASINGER
A brand of DURAG data systems
GmbH**
Branch Office Austria
Lastenstraße 36, City Tower 2
4020 Linz, Austria
Tel. +43 732 60 99 60-0
Fax +43 732 60 99 60-4
office@utas.at

Hegwein

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

SMITSVONK

SMITSVONK Holland B.V.
P.O. Box 180, 2700 AD Zoetermeer
Goudstraat 6, 2718 RC Zoetermeer
Netherlands
Tel. +31 79 361 35 33
Fax +31 79 361 13 78
sales@smitsvonk.nl

DURAG SIENA

DURAG Siena do Brasil Ltda
Rua Vinte e Dois de Agosto, 66
Diadema - SP
09941-530 Brazil
Tel. +55 11 4071-5050 r.28
Fax +55 11 4077-1718
info@duragsiena.com.br

GRIMM AEROSOL TECHNIK

**GRIMM Aerosol Technik
GmbH & Co. KG**
Dorfstraße 9
83404 Ainring, Germany
Tel. +49 8654 578-0
Fax +49 8654 578-35
info@grimm-aerosol.com

D-FS 50
Furnace Camera
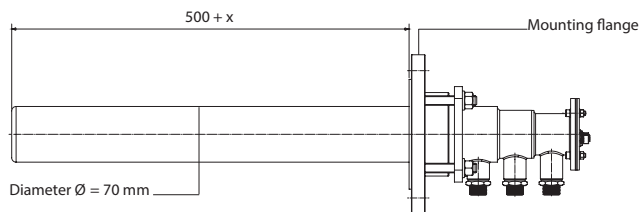
Live video out of the combustion chamber

▶ **Fast detection of process changes and radiation changes**
▶ **Digital camera – much higher resolution than PAL/NTSC**
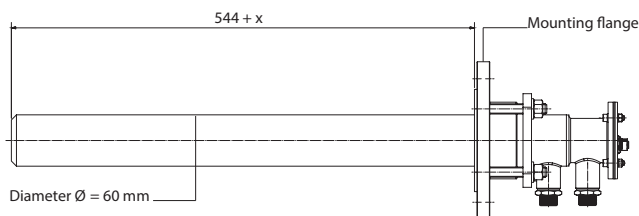▶ **Process temperatures till 2000 °C**

Features

▶ **Up to 2000 °C**
Air and water-cooled versions for use inside the combustion chamber
▶ **Different FOV (field of view)**
Adaptation of the lens system to the application
▶ **Digital colour camera**
Progressive Scan with 1280 x 960
▶ **PT100**
Monitoring of temperature at sensor tip
▶ **Length up to 1500 mm (60")**
Different lengths for adaptation to wall thickness and installation position
▶ **Modular design**
Minimises repair costs in the extreme case of a permanent cooling media failure – sapphire window separately replaceable
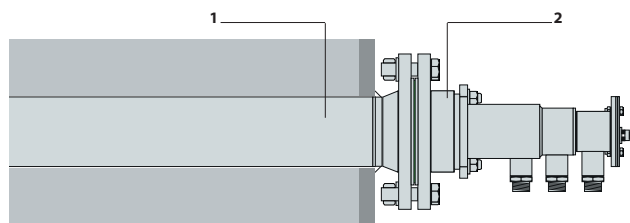
Benefits

▶ **Brilliant live images**
High resolution lens, perfectly suited for low-light, combined with modern digital camera: live video in real time
▶ **Detection of radiation changes**
Due to the non automatic but remotely controlled exposure time radiation changes of the process or the flames can be detected immediately
▶ **Wide view**
Installation with protection tube in the furnace wall, no protection window necessary
▶ **Low maintenance**
No retraction unit necessary – special high temperature lens survives short interruptions of cooling media without damage
▶ **Flexible system**
Optional upgrades with Thermography and Analysis Modules, adaptation to the application possible

D-FS 50 water cooled

500 + x — Mounting flange
Diameter Ø = 70 mm

D-FS 50 air cooled

544 + x — Mounting flange
Diameter Ø = 60 mm

Mounting flange

Water cooled: Flange DN80 PN10 with protection tube **(1)**
Mounting flange W70-DN80 **(2)**

Air cooled: Flange DN65 PN16 with protection tube **(1)**
Mounting flange A60-DN65 **(2)**

Technical data

Video System Resolution (Standard)	1280 x 960
Field of view	90: 90°, 72°, 54° (diag., horiz., vert.) 60: 60°, 48°, 36° 30: 35°, 28°, 21°
Max. penetration depth (see drawing) D-FS 50 … 700 D-FS 50 … 1100 D-FS 50 … 1500	x = 0 mm x = 420 mm x = 840 mm
Weight D-FS 50 … W70–700 D-FS 50 … A60–700	6.4 kg 4.2 kg
Max. temperature in combustion chamber D-FS 50 … W70–xxxx D-FS 50 … A60–xxxx	up to 2000 °C (3632 °F) up to 1600 °C (2912 °F)
Max. ambient temperature without purge air with purge air <40 °C	–30 … +45 °C (113 °F) –30 … +80 °C (176 °F)
Maximum pressure in the furnace	–100 … +100 mbar
D-FS 50 (water cooled) Amount of cooling water Amount of purge air	>500 l/h@<45 °C (113 °F) >10 Nm3/h@T<45 °C (113 °F)
D-FS 50 (air cooled) Amount of cooling water Amount of purge air	>30 Nm3/h@T<60 °C (140 °F) >10 Nm3/h@T<45 °C (113 °C)

D-FS2 VIS

Furnace Sensor VIS

Thermography and Live-Video
out of the combustion chamber

▶ **Digital (GigE) or analog video output**

▶ **Water or air cooled up to 2000 °C in the combustion chamber**

▶ **For integration in the D-VTA 200 Thermography System with a
temperature measurement range of 800 °C up to 2000 °C**

▶ **Special endoscope with high optical resolution and different
camera models (e. g. 1280 x 960 pixel or 200 frames/sec.)**

NEW

▶ The special endoscope transfers the image in high resolution out of the combustion chamber and allows the use of new different camera modules

▶ D-FS2 VIS is available with analog (PAL) or digital (GigE) video output

▶ Digital versions with 1280 x 960 pixel or with up to 200 frames/sec. are available

Other features

▶ Air or water cooled versions of the D-FS2 are developed for continuous operation (24/7) and enter the combustion chamber for a wide field of view (FOV)

▶ With different lenses the FOV of the D-FS2 can be optimized for the application

▶ The D-FS2 can be expanded to a Thermography- and Analysis System with the System Control Unit (D-VTA 200)

▶ An optional Retraction Unit with a dedicated Sensor Control Unit is available

Variations of D-FS2

Furnace Sensor VIS water cooled

diameter Ø = 70 mm
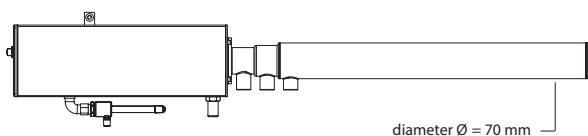
Furnace Sensor VIS air cooled

diameter Ø = 60 mm
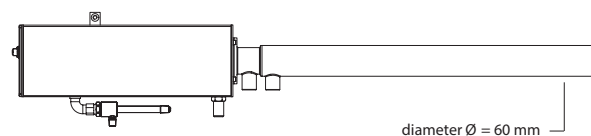
Variable

Variable	Optionen
Spectral range	VIS IR
Field of view	90: 90°, 72°, 54° (diag., horiz., vert.) 60: 60°, 48°, 36° 30: 35°, 28°, 21°
Video standard	PAL: Analogue PAL-signal IP: Digital over Ethernet
Camera type	Definition of camera
Cooling	W70: Water (Ø cooling jacket= 70 mm) A60: Air (Ø cooling jacket = 60 mm)
Length Cooling jacket	700 (usable length with RU* 430 mm) 1100 (usable length with RU* 830 mm) 1500 (usable length with RU* 1230 mm)
Sonderversion	MOBILE

* Retraction Unit

Technical data

Technical data		
Video System	Resolution PAL Resolution GigE (Standard)	768 x 582 1280 x 960@30f/sec.
Measurement range with D-VTA 200 Software	800 up to 2000 °C (1472 up to 3632 °F)	
Weight	D-FS2 …W70 – 700 D-FS2 … A60 – 700	app. 12 kg (24 lbs.) app. 10 kg (22 lbs.)
Max. temperature in combustion chamber	D-FS2 … W70 – xxxx D-FS2 … A60 – xxxx	up to 2000 °C (3632 °F) up to 1400 °C (2552 °F)
Temperature monitoring at endoscope tip	PT100	
Maximum ambient temperature with optional Vortex cooler	–30 up to +60 °C (–22 up to 140 °F) –30 up to +80 °C (–22 up to 176 °F)	
Maximum pressure in the furnace	–100 up to +100 mbar	
Cooling media (water cooled)	Amount of cooling water Amount of purge air	> 500 l/h > 15 Nm3/h
Cooling media (air cooled)	Amount of cooling water Amount of purge air	> 35 Nm3/h > 15 Nm3/h

© DURAG GROUP 02/2016 · Subject to change without notice

Pict. left:
Molten glass bed

Pict. center:
Hard coal burner – Image shows a bad combustion

Pict. right:
Cement clinker cooler

D-FS2 IR

Furnace Sensor IR

Thermography and Live-IR-Video
out of the combustion chamber

Identify temperatures above 250 °C

▶ **Temperature measurement range of 250 °C up to 1200 °C**

▶ **Special IR-Endoscope for high sensitivity and high resolution**

▶ **Compatible to the Thermography and Analysis System (D-VTA 200)**

▶ **Water or air cooled versions are available**

NEW

▸ The IR endoscope specialy developed for this Furnace Sensor is highly sensitive and transfers the radiation nearly lossless with high resolution out of the combustion chamber

▸ The uncooled InGaAs CCD-camera used in the D-FS2 IR delivers digital infrared images

▸ The temperature measurement range is 250 °C up to 1200 °C

Other features

▸ The air or water cooled versions of the D-FS2 are developed for continuous operation (24/7) and enters the combustion chamber for a wide field of view (FOV)

▸ With different lenses the FOV of the D-FS2 can be optimized for the application

▸ The D-FS2 can be expanded to a Thermography- and Analysis System with the System Control Unit (D-VTA 200)

▸ An optional Retraction Unit with a dedicated Sensor Control Unit is available

Variations of D-FS2

Furnace Sensor IR water cooled

diameter Ø = 70 mm
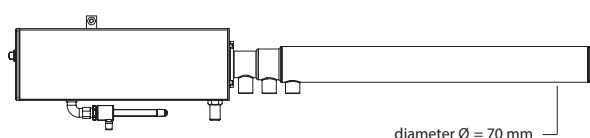
Furnace Sensor IR air cooled

diameter Ø = 60 mm
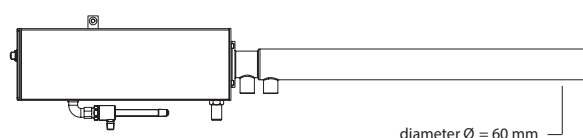
## Variable / Options

Variable	Options
Spectral range	VIS IR
Field of view	90: 90°, 72°, 54° (diag., horiz., vert.) 60: 60°, 48°, 36° 30: 35°, 28°, 21°
Video standard	PAL: Analogue (PAL-Signal) IP: Digital over Ethernet
Camera Type	Definition of camera
Cooling	W70: Water (Ø cooling jacket = 70 mm) A60: Air (Ø cooling jacket = 60 mm)
Length cooling jacket	700 (usable length with RU* 430 mm) 1100 (usable length with RU* 830 mm) 1500 (usable length with RU* 1230 mm)
Special version	MOBILE

* Retraction Unit

Technical data

Video System	Resolution Ethernet	320 x 240 @30 frames/sec.
Measurement range with D-VTA 200 Software	250 up to 1200 °C (1472 – 3632 °F)	
Weight	D-FS2 …W70 – 700 D-FS2 … A60 – 700	app. 12 kg (24 lbs.) app. 10 kg (22 lbs.)
Max. temperature in combustion chamber	D-FS2 … W70 – xxxx D-FS2 … A60 – xxxx	up to 2000 °C (3632 °F) up to 1400 °C (2552 °F)
Temperature monitoring at endoscope tip	PT100	
Maximum ambient temperature with Vortex cooler	–30 up to +60°C (–22 up to 140°F)	
Maximum pressure in the furnace	–100 up to +100 mbar	
Cooling media (water cooled)	Amount of cooling water Amount of purge air Amount for Vortex cooler	> 500 l/h > 15 Nm3/h 15 Nm3/h
Cooling media (air cooled)	Amount of cooling water Amount of purge air Amount for Vortex cooler	> 35 Nm3/h > 15 Nm3/h 15 Nm3/h

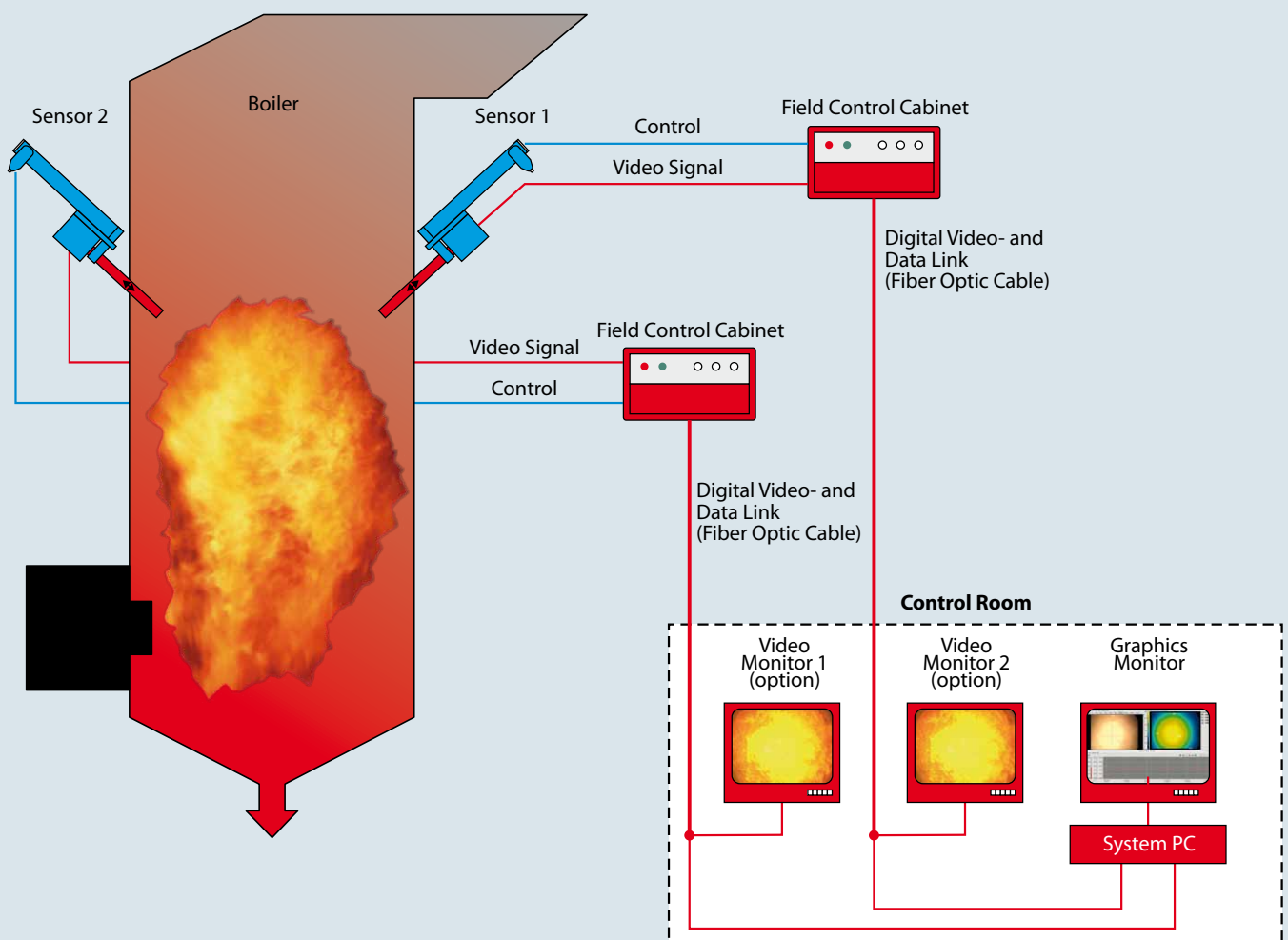© DURAG GROUP 02/2016 · Subject to change without notice
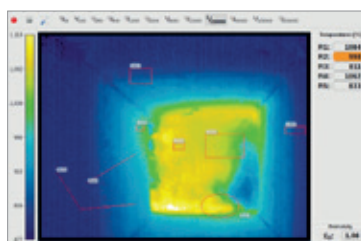
Pict. left:
Waste incinerator – view of the grate

Pict. right:
Waste incinerator – thermography image of the grate

CE

D-VTA 200

Video-based Thermography for Combustion Processes

Sensor 2

Boiler

Sensor 1

Control

Field Control Cabinet

Video Signal

Digital Video- and
Data Link
(Fiber Optic Cable)

Video Signal

Field Control Cabinet

Control

Digital Video- and
Data Link
(Fiber Optic Cable)

Control Room

Video
Monitor 1
(option)

Video
Monitor 2
(option)

Graphics
Monitor

System PC

DURAG GROUP smart solutions for combustion and environment

Video Monitoring

The Video-based D-VTA 200 Thermography System

is a modular system for monitoring industrial high temperature processes. Intelligent sensors allow contactless, optical and thermal online analysis of processes in the combustion chamber. Applications include:

- Detection of the Temperature Distribution in side combustion chambers; analysis of unbalanced combustion processes
- Burning analysis and slag monitoring in power plants
- Visualization of flame post combustion chambers and flame front monitoring in waste incineration plants
- Visualization and temperature distribution analysis of grate based firing systems, f.e. biomass and co-firing
- Monitoring ore calcination and hazardous waste disposal in the chemical industry
- Annealing and pusher furnace monitoring in the steel industry
- Scale formation and melting charge control in the glass industry.

The Sensors

have been specially developed for the harsh working conditions in industrial combustions.
The sensor housing contains the special boroscope as optical system, or the videoscope and the industrial CCD camera. In this design all electronic components are operated outside the kiln area, in the cooled camera housing.
The slim, air or water-cooled sensor shaft (Ø 43mm) minimises the mechanical stress (abrasive dust) and the thermal influence on the sensor parts in the combustion chamber.
The optical system is protected against mechanical and thermal damage by a sapphire lens at the sensor tip, in addition to air flushing. As no moving parts (no mirrors, prisms or motors) are located in the process-oriented area, the sensors achieve a high availability with minimum service requirement.

The Field Components

- Pneumatically operated retraction system with monitoring units for the cooling and flushing media, including integrated air accumulator
- Field control cabinet for control of the sensors, signal processing for the data and video transmission via fibre-optic cable to the control room.

The Control Room Equipment

- Linux based system computer for temperature calculation, thermography presentation
- Video monitor for online colour display

The Video System

The basic system comprises the above-mentioned system components, without system computer. It enables visual monitoring through real-time colour video display.

Thermography

The Thermography Analysis System

The thermography system comprises the components of the video system plus the system computer with software modules.
It operates as a spatial optical pyrometer on the basis of image data processing and offers, in addition to the video system:
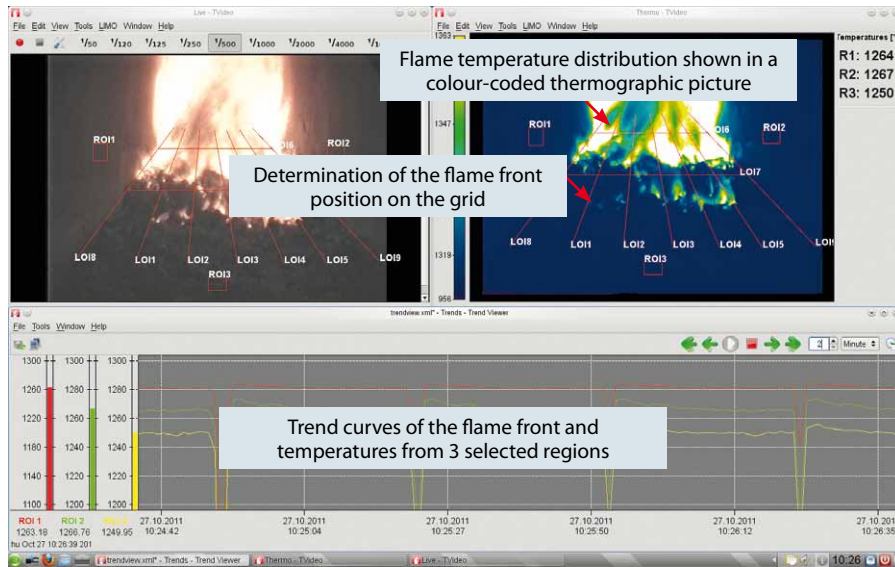
- Temperature determination of each visible image point of the video sensor
- Thermal analysis of the local temperature distribution
- Temperature definition within freely definable measuring window and lines (ROI = Region of Interest / LOI = Line Of Interest).
- Analysis of thermal samples to identify anomalies in the combustion process

All data of the thermography system can be transmitted to the process control system via a standardized data interface.
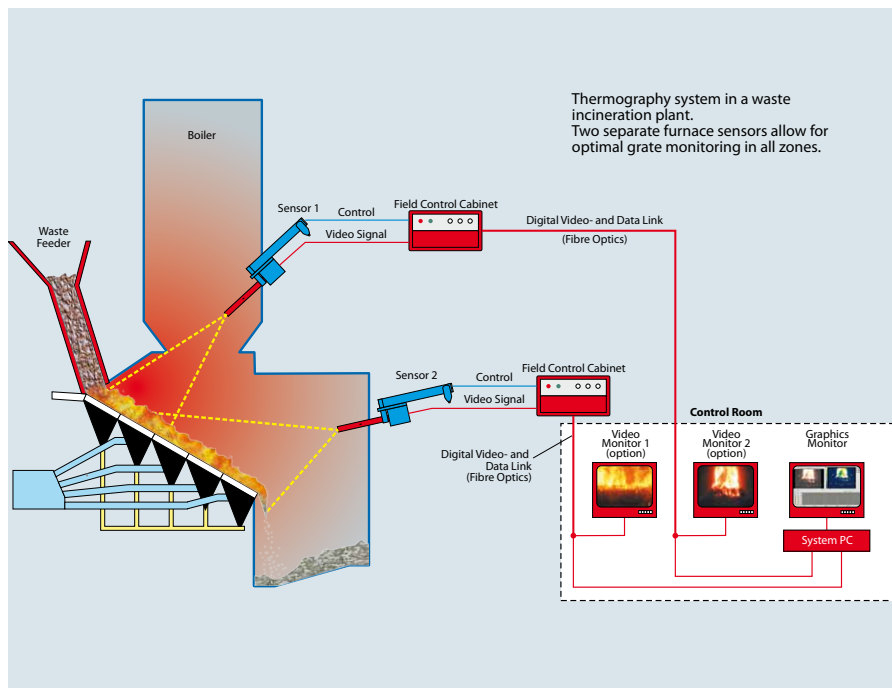

Furnace Camera with Retraction Unit (water-cooled)

Waste Incineration Plant

Power Plant

Chemical & Petrochemical Industry

Analysis System

Flame temperature distribution shown in a colour-coded thermographic picture

Determination of the flame front position on the grid

Trend curves of the flame front and temperatures from 3 selected regions

Thermography screen (waste incineration plant)

Thermography system in a waste incineration plant.
Two separate furnace sensors allow for optimal grate monitoring in all zones.

D-VTA 200 System in a Waste Incineration Plant

Technical Data

Video system	PAL, picture elements: 752(H) x 582(V), fixed focus
Thermography from total radiation	Temperature range 1000°C – 2000°C
Optical alignment	Sensor 0°: axially-parallel to sensor axis; Sensor 45°: angled 45° to sensor axis
Optical field of view	Sensor 0°: horizontal 72°, vertical 54°, diagonal 90°; Sensor 45°: horizontal 48°, vertical 36°, diagonal 60°
Data interfaces on the system PC	RS232, RS422, RS485: ASCII, MODBUS; Ethernet: TCP/IP: FTP, MODBUS
Auxiliary energy	230 V / 60 Hz & 115 V / 50 Hz, 500 VA
Gas temperature in combustion chamber	Water-cooled sensor <2000°C
Ambient temperature	Sensor / Retraction: 0°C…60°C, Field control cabinet: 0°C…55°C
Material	Sensor: stainless steel 1.4571 / 1.4301, Field control cabinet: steel sheet, painted in RAL 7035
Dimensions / Weights	Diameter of sensor tip: water-cooled 43 mm
Immersion depth in combustion chamber	max. 450 mm from welding plate, other lengths optional
Space requirement for sensor / retraction device	1450 x 500 x 800 mm (LxWxH)
Field cabinet	600 x 380 x 210 mm (HxWxD)
Cable length	Sensor/Retraction – Field control cabinet 14 m
Connection Site / Control Room	Optical Fiber, max. 1000 m
System PC	19" industrial housing, 4 HE, depth 450 mm
Weights	Sensor with retraction and carrier 70 kg, Field control cabinet 15 kg
Cooling water volume	350 l/h, 1.5…8 barg
Cooling water temperature	Inlet: <45°C, Outlet: Temperature increase <10° C
Cooling water quality	Clean, chemically neutral, non-corrosive, Hardness: <5°dH / <28 mMol/l
Compressed air volume	max. 25 Nm³/h
Compressed air pressure	5 – 8 barg
Compressed air temperature	5…40°C
Compressed air quality	dry, free from dust, aerosols, oil
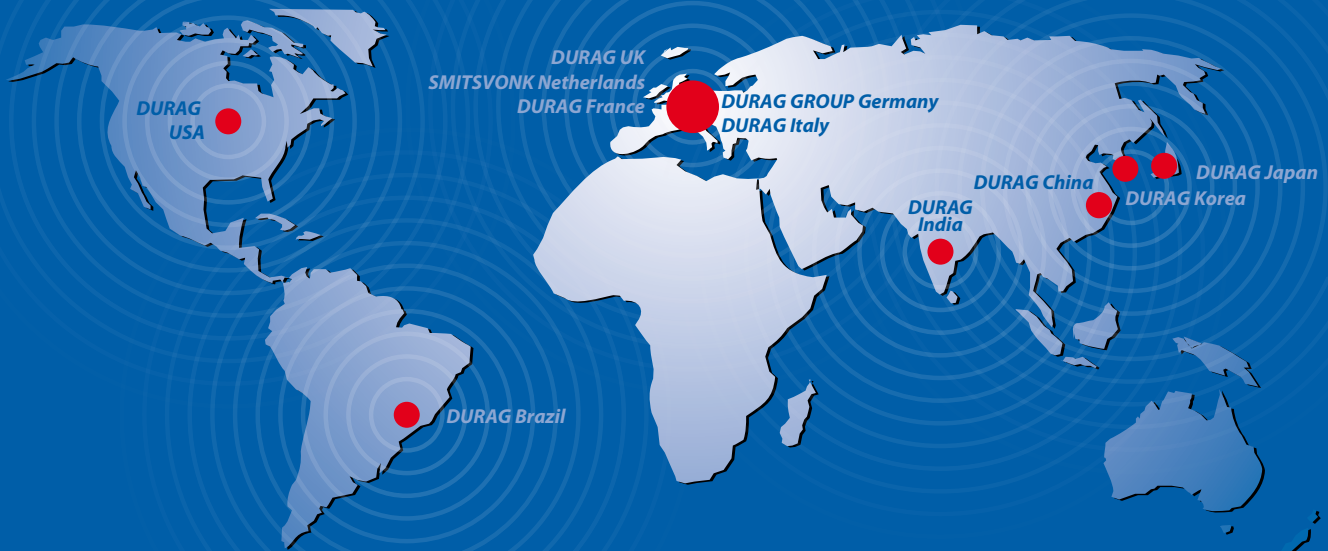
Steel Industry

Biomass Plants

Glas Industry

DURAG UK
SMITSVONK Netherlands
DURAG France
DURAG GROUP Germany
DURAG Italy
DURAG USA
DURAG China
DURAG Japan
DURAG Korea
DURAG India
DURAG Brazil

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. +21 60732979-206
Fax +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 3902 3306
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

DURAG GROUP   smart solutions for combustion and environment

D-VTA 200

Transportable System
D-VTA 200-Mobile

A comprehensive on-line process analysis is the fundamental requirement used in several types of process plants to assist a full range of functional methods like commissioning, functional testing and plant optimization, defect analysis and predictive maintenance.

This particularly applies to high temperature processes based on fossil fuel-fired combustion systems.

Typical applications for this are Power Plants fired with any kind of fossil fuel, Waste Incinerator Plants, Biomass Incinerator Plants, Cement Clinker Production Plants, Furnaces/Ovens in Petrochemical and Steel Industries as well as in Metal and Glass Processing Plants.

For these high temperature processes the contact-free online information directly out of the combustion chamber with combustion process and temperature analysis is the determining technology for all procedural details like:

- Combustion stability and ignition control
- Combustion management and spatial temperature distribution
- Local fuel-/air ratio and efficiency
- Burnout characteristic with CO_x and loss of Ignition control
- Slagging properties and cleaning cycles
- Temperature based material stress
- Product quality in Cement, Glass, and Metal Industries

The answer to this measurement and analyzing task is the D-VTA 200-Mobile system. The D-VTA 200-Mobile system is the adaptable, not fixed stationary installed Combustion analysis system based on optical analysis of the combustion process.

The system offers an on-line inspection of the combustion system and the combustion chamber on the basis of online spatial multi point temperature measurement with Thermography and real time color video analysis directly from the furnace out of the combustion chamber with big optical opening angle and high pixel resolution. It enables the user to easily compare different combustion situations, the combustion from one furnace with another or the performance of an individual burner.

The D-VTA 200-Mobile system consists of the Thermography Software on a dedicated note-book in connection with the required Durag Sensor-Mobile, which can be either air or water cooled and is available with different viewing angles. The temperature of the sensor tip is continuously monitored and displayed in the thermography software. A tripod for the sensor and a dust/water proof case for the notebook are available (optional).
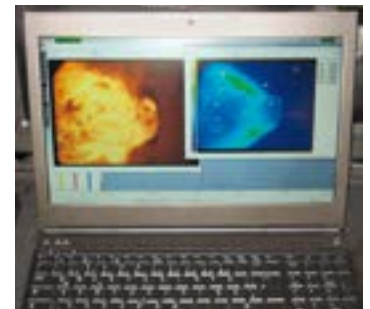
Technical Data:

Video System	Digital over GigE, standard resolution 1280 x 960 pixels
Thermography for each pixel, range	1.000 – 2.000 °C / 1,800 – 3,600 °F
Optical alignment	Sensor 0°: axially-parallel to sensor axis Sensor 45°: angled 45° to sensor axis Sensor 60°: angled 60° to sensor axis
Optical field of view	Sensor 0°: horizontal 72°, vertical 54°, diagonal 90° Sensor 45°: horizontal 48°, vertical 36°, diagonal 60° Sensor 60°: horizontal 48°, vertical 36°, diagonal 60°
Minimal wall opening for sensor	45 mm diameter
Weight of sensor	App. 12 kg
Auxiliary Power, Notebook	100 ... 240 V, 50 ... 60 Hz.
Temperature in combustion chamber	Up to 2.000 °C / 3,600 °F, depending on cooling media
Ambient temperature	Sensor housing and cable: -30 ... +80 °C / -22 ... +176 °F Dedicated notebook: +1° ... 40 °C / +34 ... 104 °F
Dedicated Notebook	15", dedicated graphic card 1920 x 1080, min. i7, SSD
Monitoring of sensor tip temperature	Continuously displayed with alarm and history
Instrument air supply, typical	15 – 50 Nm³/h
Optional cooling water supply	350 l/h

09/16-Specifications and descriptions: subject to change without notice

Systems for permanent installations: see brochure D-VTA 200.
Systems for permanent hazardous area installations: see brochure D-VTA 200 Ex.