DURAG GROUP

Product Overview Combustion Technology

1948-2008 60 years DURAG

DURAG GROUP smart solutions for combustion and environment

DURAG combustion technology

Large-scale power plant

Chemical process combustion

The DURAG GROUP's products support all types of industrial combustion processes throughout the world. These include, for example, fossil fuel power stations, plants in the chemical industry, refineries, cement plants, waste incinerators, steam generators, thermal power plants and gas turbines.

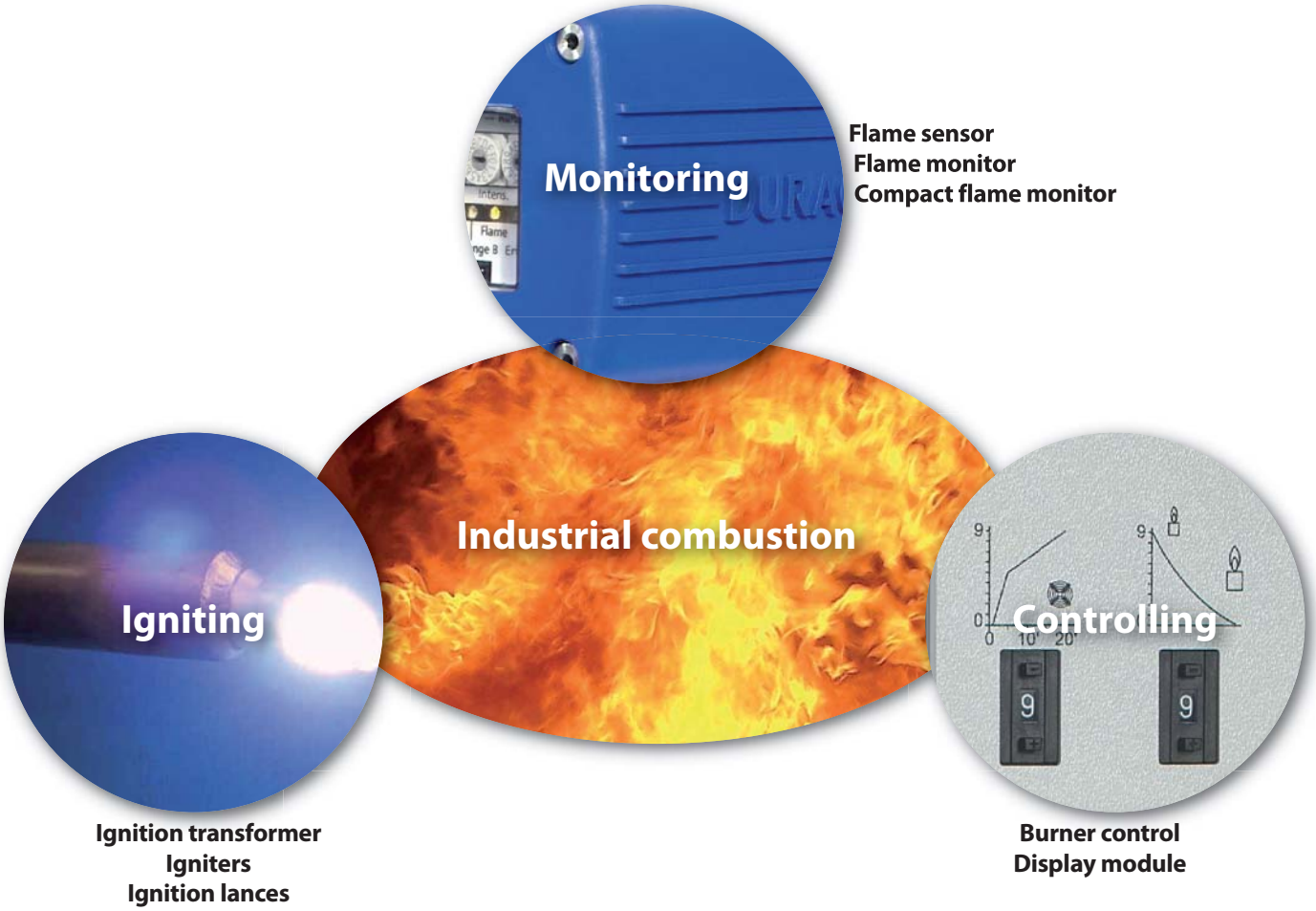
We can also provide solutions for applications in special environments, such as extreme climatic zones or potentially explosive atmospheres.

Sulphur recovery plant

Waste gas heat treatment

Rotary kiln

Refinery



Flame monitoring

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

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

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

Ionisation detection

Flame monitors with ionisation detectors use the ionising property of flames. They are used primarily on smaller gas burners and pilot burners.

Detection of the optical signal

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

Infra-red detectors (IR)

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

Flames radiating in the UV range, but whose UV component is absorbed by dust, steam or other substances, can often also be monitored using infra-red detectors. Products with the codes IG, IGA, and ISF use these detectors.

Ultra-violet detectors (UV)

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

Detectors for visible radiation (VIS)

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

Flame monitor

Particularly cost-effective, fail-safe flame monitors for the monitoring of gas and oil burners as well as combined gas/oil burners.

D-IO 55

D-IR 55

D-UV 55

Features

- monitoring of gas and oil burners of any load
- suitable for intermittent operation and continuous operation (only D-IO 55-20)
- simple installation on TS 35 DIN-rail.

Applications

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

Certifications

- DVGW
- APAVE (only D-IO 55)
- UL 372
- FM Class 7610

Functional description

The flame monitor comprises of a control unit and flame sensor.

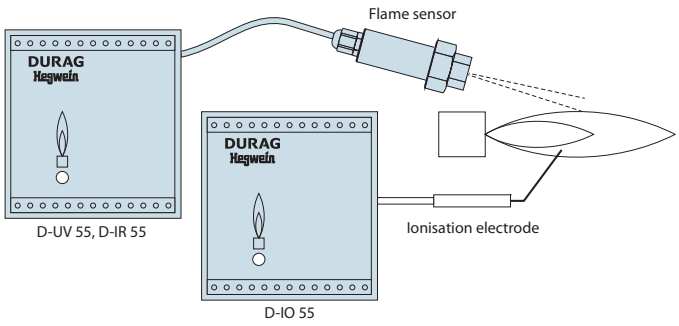
- Optical flame sensors generate a signal from the UV or IR range of the flame radiation
- Flame sensors with an ionisation electrode process a current flowing through the flame

Models

- **D-IO 55**
  Ionisation flame monitor for intermittent or continuous operation.
  Also suitable for single electrode operation in conjunction with DURAG ignition transformers, model D-HG 55.
- **D-IR 55**
  Infra-red flame monitor for intermittent operation.
  Analyses flame intensity (flickering) in conjunction with the D-LE 55 ISF-CG flame sensor.
- **D-UV 55**
  UV flame monitor for intermittent operation.
  Analyses the flame intensity in conjunction with the D-LE 55 UL-CG flame sensor.

Accessories

- **Cable** for connecting the ionisation electrode to the ionisation flame monitor (kleZ912F0)
- **Ball valve** for closing the sighting tube (D-ZS 133 III)
- **Swivel mount** for alignment of the flame sensor to the flame to be monitored (D-ZS 033 III)
- **Test light source** for D-UV 55/D-LE 55 for functional test of the flame monitor, battery operated (D-ZS 091).
- **Test light source** for D-IR 55/D-LE 55 ISF-CG for functional test of the flame monitor, voltage supply 115/230 VAC / 42-60Hz (D-ZS 093)
- **Thermal isolator** with electrical insulation for D-LE 55 UL-CG and D-LE 55 ISF-CG flame sensor (D-ZS 117 III).



Flame monitor (control unit)		Flame sensor	
Operational mode	Intermittent operation	Spectral sensitivity	D-LE 55 ISF-CG: 790 – 1050 nm D-LE 55 UL-CG: 190 – 270 nm
Supply voltage	115 / 230 VAC, 50 / 60 Hz		
Perm. ambient temperature	-20...+60°C	Perm. ambient temperature	-20...+60°C
Safety time	1s, 3s or 5s	Mounting	G 1" or G ½"
Display	LED	Protection class	IP67
Protection class	IP20	Dimensions	Ø27 mm, length 116 mm
Flame relay	1 relay output 250 VDC / 2 A	Weight	0.45 kg
Installation	TS 35 DIN-rail		
Dimensions Weight	70 x 75 x 118 mm (L x W x H) approx. 0.3 kg		

Compact flame monitor

Self-monitoring and fail-safe compact flame monitor for the monitoring of gas, oil and coal flames with integrated UV, VIS or IR flame sensor, primarily in single burner furnaces.

D-LX 100

Features

- Suitable for continuous operation and 72-hour operation according to TRD 604
- Compact design, flame sensor and control unit in one enclosure, takes up no space in control cabinet
- LED display for settings and operational status
- ATEX approved (D-LX 100 .../94 Ex for zone 1 and D-LX.../97 Ex for zone 2).

Applications

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

Certifications

- DVGW
- APAVE
- UL 372
- FM Class 7610
- AGA: AG 210
- GOST-R
- PTB (ATEX).

Functional description

The D-LX 100 flame monitor analyses flame radiation using the integrated flame sensor signal.

The flame intensity is present as a current at one output 0/4...20mA for further analysis.

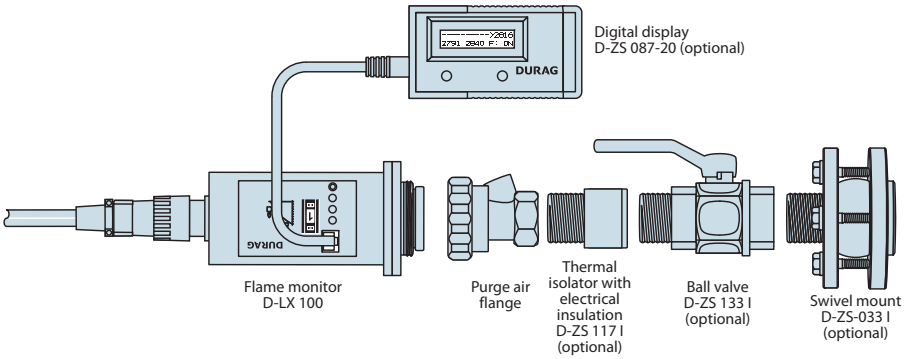
Design

- Integrated compact device.

D-LX 100 / 94 Ex
D-LX 100 / 95 Ex

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 (D-ZS 033 - I)
- **Thermal isolator** with electrical insulation (D-ZS 117 - I)
- **Ball valve** for closing sighting tube (D-ZS 133 - I)
- **Terminal box** for connecting the flame monitor (D-ZS 140 / 141)
- **Power supply unit** to supply two D-LX 100 (D-NG 24/05).



Operational mode	Intermittent operation, continuous operation, 72-hour operation without permanent supervision	Flame intensity	0/4...20mA
Safety	Self-monitoring and fail-safe	Perm. ambient temperature	-20...+60°C
Auxiliary supply	24 VDC	Dimensions / Weight	90 x 92 mm, length approx. 350 mm / approx. 1.8 kg
Protection class	IP67	Sighting tube connection	G 1¼"
Flame relay	1x NO contact, 230 VAC, 2 A	Purge air connection	G ½"
Status relay	1x NO contact, 230 VAC, 2 A	**D-LX 100 Ex**	
Safety time	1, 3, 5 s	Ex-protection optional optional optional	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 nA nC T5/T6
Spectral ranges	UV, VIS, IR		
Viewing angle	6°		
Number of ranges	1	Dimensions Weight	Ø130 mm, length 313 mm approx. 4.3 kg
Switching threshold	0...9	Sighting tube connection	G 1"
Display	LED display	Protection class	IP65

Compact flame monitor

Self-monitoring and fail-safe compact flame monitor for the monitoring of gas, oil, and coal flames with integrated UV or IR flame sensor.

D-LX 200

Features

- 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.

Applications

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

Certifications

- DVGW
- SIL3.

0085 DVGW product

SIL 3

Functional description

The D-LX 200 compact flame monitor analyses flame radiation using the integrated flame sensor signal.

The flame intensity is available as current output 0/4...20 mA for further analysis.

Flame properties and parameters of the flame monitor can be transmitted to a PC or PDA via a RS485 and an IrDA interface.

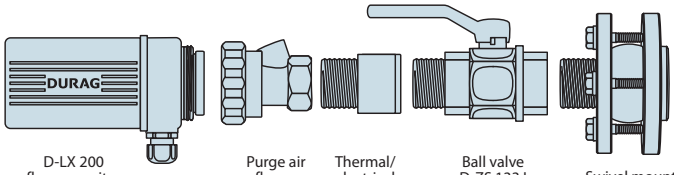
Design

- Integrated compact device.

User interface of the flame monitor software

Accessories

- **Optical adjustment aid** for the alignment of the swivel mount on the sighting tube (D-ZS 118)
- **LED bar graph display** for the flame intensity (D-ZS 129)
- **UV-A, UV-B and IR-test light source** 230 V/50 Hz (D-ZS 093)
- **Swivel mount** for the alignment of the flame monitor (D-ZS 033 - I)
- **Thermal isolator** with electrical insulation (D-ZS 117 - I)
- **Ball valve** for closing the sighting tube (D-ZS 133 - I)
- **Terminal box** for connecting the flame monitor (D-ZS 140-12)
- **Power supply unit** for supply of up to two D-LX 200 (D-NG 24/05).



D-LX 200 flame monitor | 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 and continuous operation	Communication	LED display, Modbus RTU, IrDA
Safety	Self-monitoring and fail-safe	Flame intensity	0/4...20 mA
Auxiliary supply	24 VDC	Ambient temperature range	-40...+85°C
Protection class	IP65	Dimensions Weight	85x85 mm,length approx. 250 mm approx. 1.25 kg
Flame relay	1x NO contact, 24 VDC, 0,5 A	Sighting tube connection	G 1¼" or 1¼" NPT(F)
Status relay	1x NO contact, 24 VDC, 0,5 A	Purge air connection	G ½" or ½" NPT(F)
Safety time	1, 2, 3, 5 s	Spectral ranges	UV, IR
Viewing angle	6°	Threshold switches	Flame intensity and flicker frequency
Ranges	2		

Flame sensor

Flame sensors for the monitoring of gas, oil and coal flames, primarily in single burner furnaces.

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 burner control
- Uniform output signal thus mutually interchangeable
- Compliance to general safety regulations.

Applications

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

Certifications

- DVGW
- APAVE
- UL 372
- FM Class 7610
- AGA: AG 210
- GOST-R.

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).

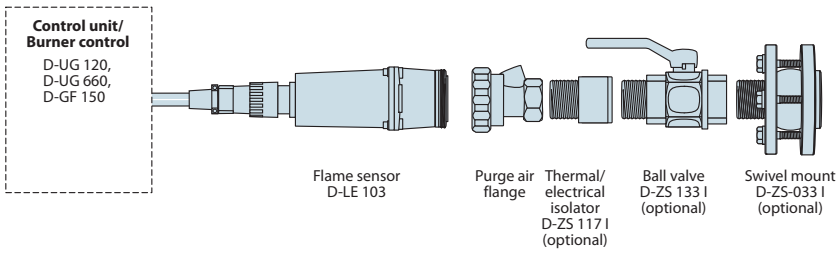
Accessories

- **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 (D-ZS 033 - I)
- **Thermal isolator** with electrical insulation (D-ZS 117 - I)
- **Ball valve** for closing sighting tube (D-ZS 133 - I)
- **Terminal box** for connecting flame sensor (D-ZS 140)

Flame sensor selection

Flame sensor	Suitable 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)



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…+60°C
Protection	with cable gland (D-LE 103…-CG) IP65, with axial plug (D-LE 103…-P) IP67	Dimensions Weight	Ø80 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		

Flame sensor

Flame sensor for the monitoring of gas, oil and coal flames, primarily in multi-burner furnces.

D-LE 603

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 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.../97 Ex for zone 2).

Applications

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

Certifications

- DVGW
- APAVE
- UL 372
- FM Class 7610
- AGA: AG 210
- GOST-R
- PTB (ATEX).

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.


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

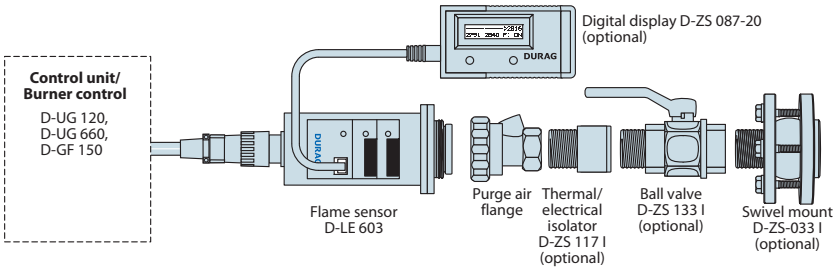
Accessories

- **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 (D-ZS 093)
- **Swivel mount** for the alignment of the flame sensor (D-ZS 033-I)
- **Thermal isolator** with electrical insulation (D-ZS 117 - I)
- **Ball valve** for closing the sighting tube (D-ZS 133 - I)
- **Terminal box** for connecting flame sensor (D-ZS 140).

Flame sensor selection

Flame sensor	Suitable 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)



Operational mode	Intermittent operation, continuous operation and 72-hour operation without permanent supervision	Dimensions	90x92 mm, length approx. 350 mm
		Weight	approx 1.8kg
Safety	Self-monitoring and fail-safe in conjunction with a control unit/burner control	Sighting tube connection	G 1¼"
Protection class	with cable gland (D-LE 603…-CG) IP65, with axial plug (D-LE 603…-P) IP67	Purge air connection	G ½"
		D-LE 603 Ex	
Gain	four settings	Ex-protection optional optional optional	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 nA nC T5/T6
High-pass filter	three settings		
Spectral ranges	UV, VIS, IR	Weight	approx. 4.3 kg
Viewing angle	6°	sighting tube connection	G 1"
Perm. ambient temperature	-20…+60°C	Protection class	IP65

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 of the flame sensor

- 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 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 whose environmental temperature near the sighting tube is too high
- Power stations
- Chemical industry
- Refineries
- Cement plants
- Waste incinerators
- Steam generators
- Heating plants.

Certifications

- DVGW
- GOST-R.

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 inj 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.

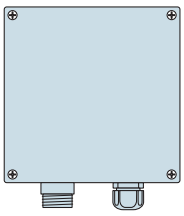
Accessories

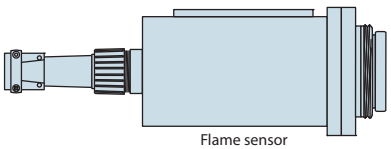
- **Digital display** for measuring the pulse rate and its extreme values (D-ZS 087-20)
- **UV-A, UV-B and IR test light source** 230 V/50 Hz (D-ZS 093)
- **Terminal box** for connecting flame sensor (D-ZS 140)
- **Installation flange** for D-LL 702 for fibre optic system (D-ZS 702)
- **Welding flange**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

Flame sensor selection

Flame sensor	Suitable 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 permanant 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 603…-CG) IP65, with axial plug (D-LE 603…-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…+60°C	Perm. ambient temperature	-20…+60°C
Dimensions Weight	160x185x100 mm (WxHxD) approx. 1.2 kg	Dimensions Weight	90x92 mm, length approx. 270 mm approx 1.2 kg

Compact flame monitor with fibre optic system

Application with
- flexible fibre optic system (D-LL 703)
- or rigid fibre optic system (D-LL 704)

D-LX 700

Features

- Suitable for continuous operation and 72-hour operation according to TRD 604
- Compact design, flame sensor and control unit in one enclosure, takes up no space in control cabinet
- LED display for settings and operational status
- Self-monitoring and fail-safe compact flame monitor for the monitoring of gas, oil and coal flames with integrated UV, VIS or IR flame sensor, primarily in single burner furnaces.

Applications

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

Functional description

The D-LX 700 flame monitor analyses flame radiation using the integrated flame sensor signal.

The flame intensity is present as a current at one output 0/4...20mA for further analysis.

The D-LL 703 and D-LL 704 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.

Design

- Integrated compact device.

Accessories

- **Digital display** for optimal adjustment of the flame sensors by 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 the flame monitor (D-ZS 140 / 141)
- **Installation flange** for D-LL 703 for fibre optic system (D-ZS 703)
- **Welding flange** for D-LL 704 for fibre optic system (D-ZS 704).

Flame monitor selection

Flame sensor	Suitable for fuels				Features
	Gas	Oil	Coal	Wood	
D-LX 700 UAF	o	++			with intensive ambient light (neighbouring burners), gain switchover
D-LX 700 UA	+	++	+		with low NO_x component, gain switchover
D-LX 700 IS	!	+	++	+	selective single burner monitoring (coal, oil)
D-LX 700 IG	o	+	++	++	selective single burner monitoring (coal, oil, wood)

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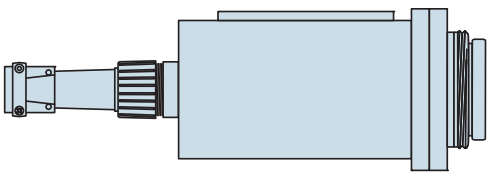


Flame sensor
D-LE 700

Operational mode	Intermittent operation, continuous operation, 72-hour operation without permanent supervision	Spectral ranges	UV, VIS, IR
Safety	Self-monitoring and fail-safe	Viewing angle	6°
Auxiliary supply	24 VDC	Number of ranges	1
Protection class	IP67	Switching threshold	0...9
		Display	LED display
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...+60°C
Safety time	1, 3, 5 s	Dimensions / Weight	90 x 92 mm, length approx. 350 mm / approx. 1.8 kg

Compact flame monitor with fibre optic system

Application with

- **flexible fibre optic system D-LL 703**
- **or rigid fibre optic system D-LL 704.**

Features

- 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.

Applications

- 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.

Certifications

- DVGW
- SIL3.

0085 DVGW product

SIL 3

D-LX 720

Functional description

The D-LX 720 compact flame monitor analyses flame radiation using the integrated flame sensor signal.

The flame intensity is available as current output 0/4...20 mA for further analysis.

Flame properties and parameters of the flame monitor can be transmitted to a PC or PDA via a RS485 and an IrDA interface.

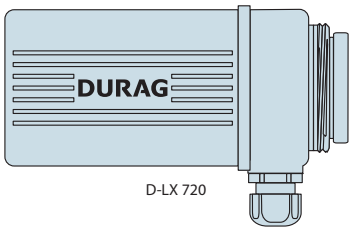
Design

- Integrated compact device.

Accessories

- **LED bar graph display** for the flame intensity (D-ZS 129)
- **Terminal box** for connecting the flame monitor (D-ZS 140-12)
- **Installation flange** for D-LL 703 fibre optic system (D-ZS 703)
- **Welding flange** for D-LL 704 fibre optic system (D-ZS 704)
- **Power supply unit** for supply of up to two D-LX 720 (D-NG 24/05).

User interface of the flame monitor software



D-LX 720

Operational mode	Intermittent operation and continuous operation	Ranges	2
Safety	Self-monitoring and fail-safe	Communication	LED display, Modbus RTU, IrDA
Auxiliary supply	24 VDC	Flame intensity	0/4...20 mA
Protection class	IP65	Ambient temperature range	-40...+85°C
Flame relay	1x NO contact, 24 VDC, 0.5 A	Dimensions Weight	85x85 mm, length approx. 175 mm approx. 1.25 kg
Status relay	1x NO contact, 24 VDC, 0.5 A	Spectral ranges	UV, IR
Safety time	1, 2, 3, 5 s	Threshold switches	Flame intensity and flicker frequency
Viewing angle	6°		

Fibre optics system

The D-LL 701, 702, 703 and 704 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
- Separate design, flame sensor and fibre optic system are connected by a fibre optic bundle protected by a conduit system
- Suitable for temperatures up to 350°C.

D-LL 702 fibre optic system

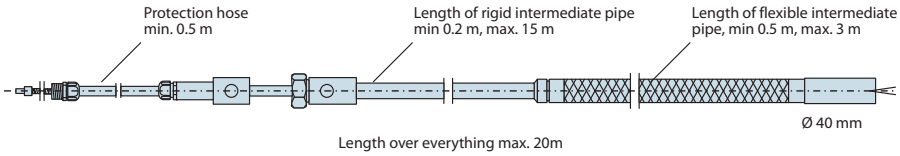
- Rigid fibre optic system
- Separate design, flame sensor and fibre optic system are connected by a fibre optic bundle protected by a conduit system
- Suitable for temperatures up to 350°C.

D-LL 703 fibre optic system

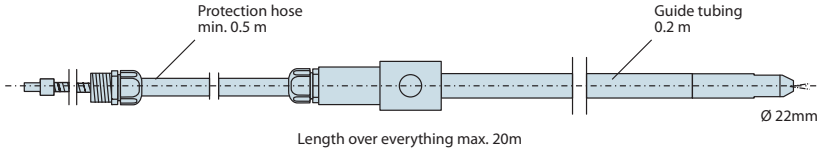
- Flexible fibre optic system
- Combined design, fibre optic system and flame sensor are directly connected
- Suitable for temperatures up to 350°C.

D-LL 704 fibre optic system

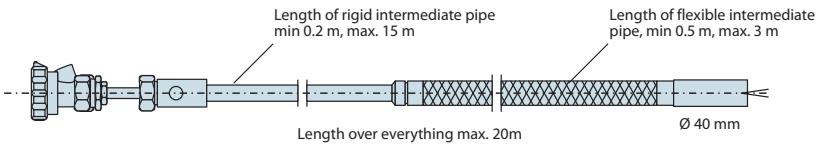
- Rigid fibre optic system
- Suitable for temperatures up to 350°C.



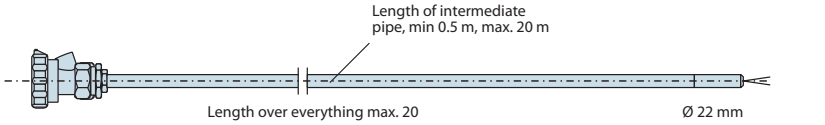
D-LL 701: flexible fibre optic system for D-LE 701			
Spectral ranges	UV, IR	Purge air connection	G ½"
Viewing angle	6°	Intermediate pipe material	1.4301
Perm. ambient temperature	-40…+350°C (optical System)	Weight	approx. 1.6 kg/m + 1 kg/m



D-LL 702: rigid 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…+350°C (optical System)	Weight	approx. 1.6 kg/m + 1 kg/m



D-LL 703: flexible fibre optic system for D-LE 703 and D-LX 700			
Spectral ranges	UV, IR	Cooling air connection	G ½"
Viewing angle	6°	Guiding tube material	1.4301
Perm. ambient temperature	-40…+350°C (optical System)	Weight	approx. 3 kg/m + 1 kg/m
Purge air connection	G ½"		



D-LL 704: rigid fibre optic system for D-LE 703 and D-LX 700			
Spectral ranges	UV, IR	Cooling air connection	G ½"
Viewing angle	6°	Guiding tube material	1.4301
Perm. ambient temperature	-40…+350°C (optical System)	Weight	approx. 2 kg/m + 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 environmental temperature near the sighting tube is too high
- Power stations
- Chemical industry, refineries
- Cement plants
- Waste incinerators
- Steam generators, heating plants.

Certifications

- GOST-R.

Flame sensor

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


D-GT 800-P

Features

- Optionally available with air/water cooling
- Deployable with high combustion chamber overpressure
- High vibrational stability.

D-GT 800

- Conforms to general safety regulations
- Self-monitoring and fail-safe in conjunction with a control unit/burner control
- Connection to the D-UG 120, D-UG 660 control unit and the D-GF 150 burner control.

D-GT 810

- Analysis of the d.c light component of the flame radiation
- Analysis with extremely fast reaction times
- Connection to any control unit with 2-wire transmitter 4...20mA.

Applications

- Burners with difficult installation conditions for conventional flame sensors or on those whose environmental 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)

- DVGW
- GOST-R
- PTB (ATEX).

Functional description

With its combination of highly sensitive photo element and sturdy design, the D-GT 800/810 flame sensor is 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 800/810 is available with different photo element for optimal selectivity when using different fuels.

Models

- Cable connection (-Ex)
- Axial plug (-P).

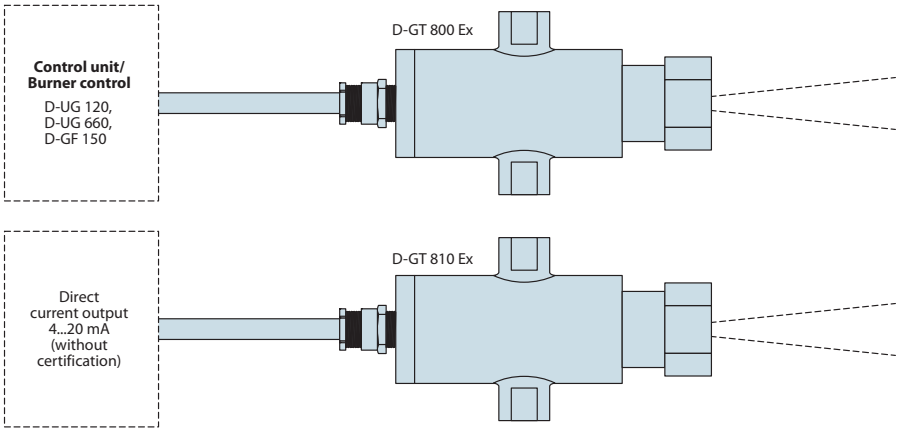
Accessories

- **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).

Flame sensor selection

Flame sensor	Suitable for		Features
	Gas	Oil	
D-GT 800/810 UAF	o	++	with intensive ambient light (neighbouring burners)
D-GT 800/810 UA	+	++	at low NO_x component

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



Operational mode D-GT 800	Intermittent operation, continuous operation and 72-hour operation without permanent supervision	Perm. ambient temperature	Without cooling: 0…+120°C Air cooling: -20…+200°C Water cooling: -20…+300°C
Operational mode D-GT 810	4...20 mA / 100 Ohm at 18 VDC 700 Ohm at 30 VDC	Vibration	10 g
Safety	Self-monitoring and fail-safe in conjunction with a control unit/burner control	Dimensions	Ø100 mm; length approx. 190 mm
Schutzart	Mit Kabelverschraubung (D-GT 800/810-P) IP67, in Ex-Ausführung (D-GT 800/810/Ex) IP66	Weight	Without cooling: approx. 1.5 kg, with cooling: approx. 2.0 kg
Ex-Schutz (D-GT 800/810 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)

Control unit

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

D-UG 120

Features

- suitable for intermittent operation, continuous operation and 72-hour operation according to TRD 604
- LED display
- Installation on DIN-rail.

Applications

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

Certifications

- DVGW
- APAVE
- UL 372
- FM Class 7610
- GOST-R.

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

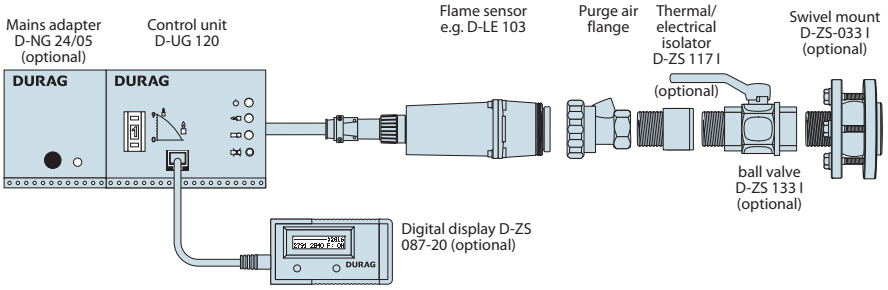
- D-LE 103 for standard applications
- D-LE 603 for selective flame monitoring
- D-LE 702/703 for special applications (fibre optics)
- D-GT 800 for particularly harsh environments
- sensors for Ex-applications are also available

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 (D-ZS 033 - I)
- **Thermal isolator** with electrical insulation (D-ZS 117 - I)
- **Ball valve** for closing sighting tube (D-ZS 133 - I)
- **Terminal box** for connecting flame monitor (D-ZS 140 / 141).



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
Power supply	24 VDC	Flame sensor	1
Protection	IP20	Display	LED
Flame relay	1x NO contact, 230VAC, 2A	Flame intensity	0/4...20 mA
Status relay	1x NO contact, 230VAC, 2A	Perm. ambient temperature	-20...+60°C
Installation	TS 35 DIN-rail	Dimensions	100 x 75 x 118 mm (WxHxD)
Safety time	1s	Weight	approx. 0.45 kg

Control unit

Self-monitoring and fail-safe control unit for the monitoring of gas, oil and coal flames with DURAG UV, UV+IR or IR- flame sensors, primarily in multiple-burner furnaces.

D-UG 660

Features

- Suitable for intermittent operation, continuous operation and 72-hour operation as per TRD 604
- 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
- APAVE
- UL 372
- FM Class 7610
- AGA: AG 210
- GOST-R.

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

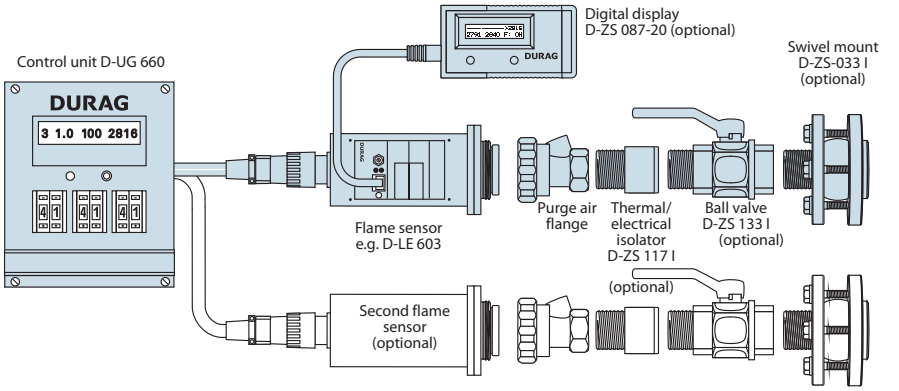
- D-LE 103 for standard applications
- D-LE 603 for selective flame monitoring
- D-LE 702/703 for special applications (fibre optics)
- D-GT 800 for particularly harsh environments
- sensors for Ex-applications are also available.

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 (D-ZS 033 - I)
- **Thermal isolator** with electrical isolation (D-ZS 117 - I)
- **Ball valve** for closing sighting tube (D-ZS 133 - I)
- **Terminal box** for connecting flame monitor (D-ZS 140 / 141)
- Various **enclosures and racks** for 1 to 4 devices.



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)
Power supply	24 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, 2A	Flame signal	0/4...20 mA
Status relay	1x switch-over contact, 230 VAC, 2A	Perm. ambient temperature	-20...+60°C
Threshold setting	00...99	Dimensions	19" plug-in module, 3 RU, 21 HP
Safety time	1 ... 5,5s	Weight	approx. 1 kg

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.

D-GF 150

Features

- Controling and monitoring of gas and oil burners of any capacity.
- Suitable for intermittent operation, continuous operation and 72-hour operation according to TRD 604
- 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 interface.

Applications

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

Certifications

- DVGW
- UL 372
- FM Class 7610
- AGA: AG 210.

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.

Flame sensors

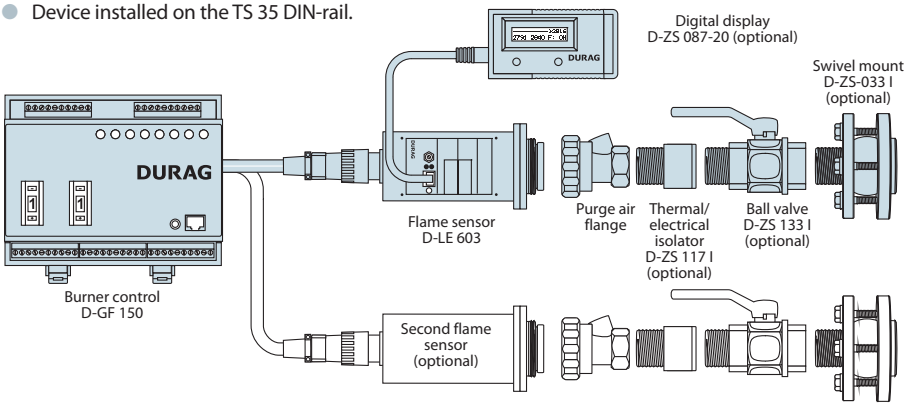
- D-LE 103 for standard applications
- D-LE 603 for selective flame monitoring
- D-LE 702/703 for special applications with fibre-optic systems
- D-GT 800 for particularly harsh environments
- Flame sensor for use in potentially explosive atmospheres are also available

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)
- **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 (D-ZS 033 - I)
- **Thermal isolator** with electrical insulation (D-ZS 117 - I)
- **Ball valve** for closing sighting tube (D-ZS 133 - I)
- **Terminal box** for connecting flame monitor (D-ZS 140 / 141).

Design

- Device installed on the TS 35 DIN-rail.



Operational mode	Intermittent operation, continuous operation, 72-hour operation without permanent supervision	Pre-purge	30 s…20 min
Safety	Self-monitoring and fail-safe	Flame sensor	1, 2 parallel or external flame
Mains voltage	115/230 VAC , 50 / 60 Hz	Display	LED
Protection	IP20	Flame intensity	0/4…20 mA
Installation	DIN-rail TS 35	Data output	to D-AM 150 / D-ZS 087-20
Threshold setting	0…9	Dimensions Weight	170 x 130 x 114 mm (LxWxH) approx. 1.5 kg

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 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.

Applications

(in conjunction with the D-GF 150 burner control)

- 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

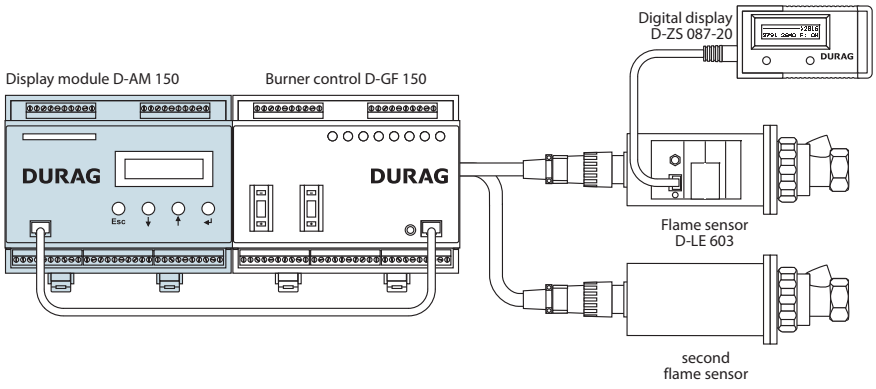
- A first out annunciator for the continuous monitoring of all connected limiters and monitor chains. Should the system be shut down, the position in which chain in which the shutdown is performed is stored.
- A MODBUS interface for outputting status and process information for the burner and D-GF 150 burner control.

Design

Device for assembling onto TS 35 DIN-rail

Additional equipment

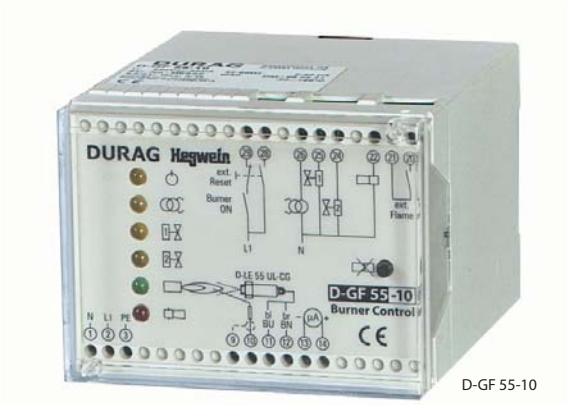
- **Chip card for data storage** and parameterisation (D-AM 150 CC).



Operational mode	Intermittent operation, continuous operation, 72-hour operation without permananent supervision	Installation	DIN- rail TS 35
Safety	First our annunciator: fail-safe	Dimensions Weight	170 x 130 x 114 mm (LxWxH)) approx. 1.2 kg
Power supply	115/230 VAC , 50 / 60 Hz	Display	Alpha-numeric LCD display
Protection	IP20	Data output	Modbus RTU

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.



D-GF 55-10

Features

- Controlling and monitoring of gas and oil burners of any capacity.
- Suitable for intermittent operation (D-GF 55-10) and continuous operation (D-GF 55-20)
- Integrated ionisation flame monitor
- Input for external flame monitor.

Applications

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

Certifications

- DVGW
- UL 372
- FM Class 7610.

Functional description

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

The burner control D-GF 55 controls

- The ignition of the burner
- The fuel valves
- Flame monitoring.

After the release of the ignition sequence, by a thermostat for example, the device performs a check of ambient light. If no flame is detected, the ignition sequence starts. If no flame forms during the ignition sequence, or if it goes out whilst the burner is in operation, an interlock is activated.

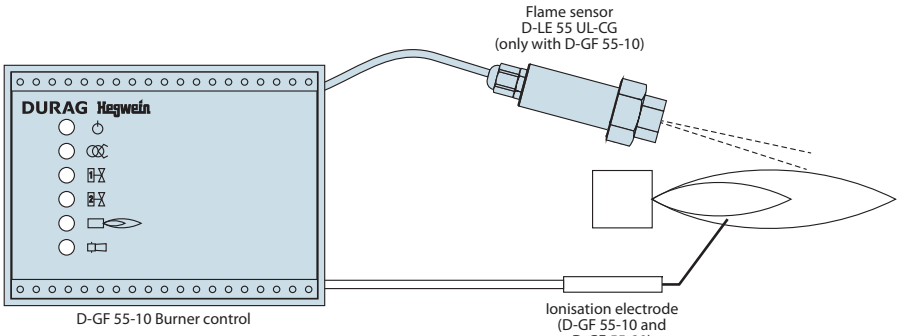
Models

- **D-GF 55-10**
  for intermittent operation
  - Deployable with the D-LE 55 UL-CG UV flame sensor or an ionisation electrode
  - Connection for external flame monitors (for continuous operation) e.g. DURAG D-LX 100 compact flame monitor or the combination of D-UG 120 with a D-LE 103 flame sensor.

- **D-GF 55-20**
  for continuous operation
  - Operation with ionisation electrode
  - Connection for external flame monitors (for continuous operation) e.g. DURAG D-LX 100 compact flame monitor or the combination of D-UG 120 with a D-LE 103 flame sensor.

Design

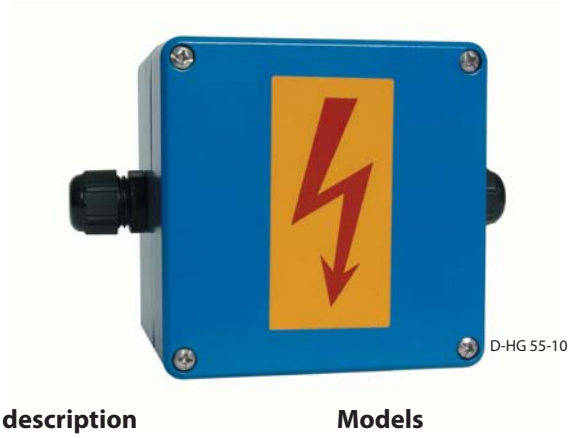
- Enclosure for DIN-rail installation.



Operational mode	D-GF 55-10: Intermittent operation D-GF 55-20: Intermittent operation and continuous operation	Operational safety time	1 s, 3 s or 5 s
		Flame intensity	0…50 µA
Safety	Self-monitoring and fail-safe	Display	LED
Power supply	115 / 230 VAC, 50 / 60 Hz	Dimensions Weight	100 x 75 x 118 mm (LxWxH) approx. 0.7 kg
Protection	IP20	**Flame sensor D-LE 55 UL-CG**	
Perm. ambient temperature	-20…+60°C	Spectral sensitivity	190 – 270 nm
Flame sensor	- Ionisation electrode - D-LE 55-UL-CG - External flame monitor	Protection	IP67
		Perm. ambient temperature	-20…+60°C
Installation	DIN-rail TS 35	Weight	approx. 0.35 kg
Start-up safety time	3 s, 5 s or 10 s	Installation	G 1" or G ½"

Electronic ignition transformer

The D-HG 55 electronic ignition transformer is suitable for the ignition of gases and liquid fuels in small burners.



D-HG 55-10

Features

- Ignition of oil and gas
- High-performance and reliable ignition
- Simple to use and installation
- Robust enclosure for industrial use
- Maintenance-free because no wearing parts
- 100 ignition sparks/second with a mains frequency of 50Hz, 120 ignition sparks/second with a mains frequency of 60Hz
- Suitable as "Ignitor Class 3 Special" in accordance with NFPA 8501 and NFPA 8502.

Anwendungen

- Chemical industry
- Refineries
- Cement plants
- Waste incineration
- Steam generators
- Heating plants.

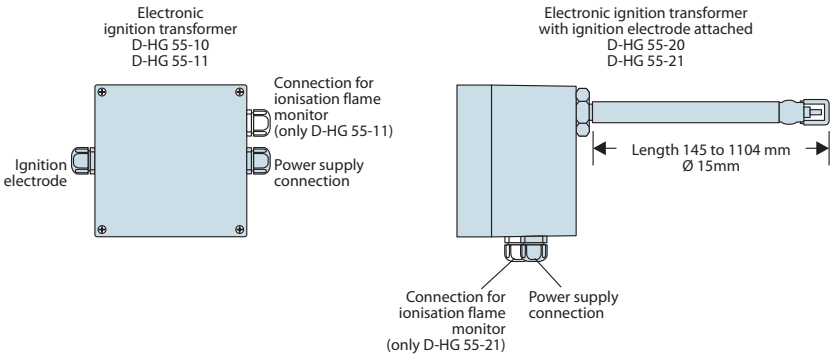
Functional description

A high-voltage Capacitor is charged up in the electronic ignition transformer. Once the required energy level has been reached, a non-wearing electronic switch (thyristor) triggers a spark discharge at the ignition tip.

The D-HG 55-11 and -21 electronic ignition transformers allow the use of the electrode as a common ignition and ionisation electrode for flame monitoring. The electrode is automatically switched over after powering off the ignition. The ionisation current may be tapped off at a terminal. The DURAG D-IO 55 ionisation flame monitor is suitable as a flame monitor.

Models

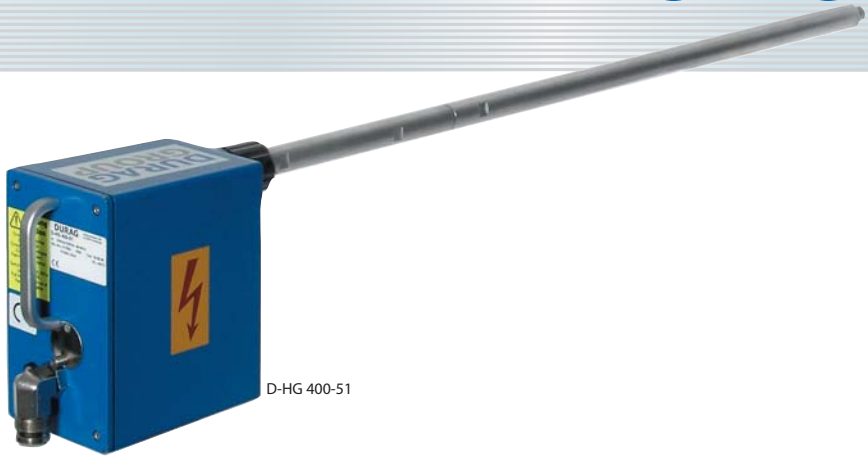
- **D-HG 55-10**
  Electronic ignition transformer for connection to an external ignition electrode
- **D-HG 55-11**
  Electronic ignition transformer for connection to an external ignition electrode with the option of connecting the electrode to an ionisation flame monitor
- **D-HG 55-20**
  Electronic ignition transformer with attached ignition electrode
- **D-HG 55-21**
  Electronic ignition transformer with attached ignition electrode with the option of connecting to an ionisation flame monitor.



Power supply	115 / 230 VAC, 50 / 60 Hz	Perm. ambient temperature	-20 … +60°C
Power consumption	15 VA	Protection	IP55
Ignition voltage	5000 V	Dimensions	100 x 100 x 80 mm ((LxWxD) (without ignition electrode)
Duty cycle	50%	Weight	approx. 0.7 kg

High energy ignition device

The D-HG 400 high energy ignition device is suitable for the ignition of gas or liquid fuels in industrial burners of any capacity.



D-HG 400-51

Features

- Ignition of liquid or gaseous fuels with large power ratings
- Compact design: control unit and ignition lance form one unit
- Ignites even heavy oil no. 6
- Special designs for potentially explosive atmospheres are available
- Special design with battery operation
- Special design for tilting burner
- No wear because thyristor controlled
- 20 ignition sparks with 4.5 J per second (i.e. 90 J total per second)
- Ignition feedback signal via integrated LED or potential-free relay output
- Suitable as "Ignitor Class 3 Special" in accordance with NFPA 8501 and NFPA 8502.

Applications

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

Certifications

- GOST-R
- PTB (ATEX).

Functional description

A high-voltage capacitor is charged up to an energy level of 4.5J in the ignition device. Once the required energy level has been reached, a non-wearing electronic switch (thyristor) triggers a spark discharge at the ignition tip.

The device provides 20 ignition sparks per second for a duration of 1 min. for reliable ignition during the start phase. It then switches to 5 ignition sparks per second.

Models

- **D-HG 400-50**
  Compact design, electronics unit and ignition lance form one unit
- **D-HG 400-51**
  As D-HG 400-50, with push-button for ignition
- **D-HG 400-53 Ex**
  For potentially explosive atmospheres as per II 2G Ex de IIC T5/T6
- **D-HG 400-65**
  Separate design, ignition lance and electronics unit are connected together via a high-voltage cable
- **D-HG 400-72 Ex**
  For potentially explosive atmospheres as per II 2G Ex d IIC T5/T6
- **D-HG 400-80**
  As D-HG 400-50, but portable, with portable battery and integrated charger (D-HG 400-81)
- **D-HG 400-90**
  As D-HG 400-50, but with flexible ignition lance for tilting burners, only in conjunction with exterior guide tubing (D-HG 400-91).

Ignition lances

The length of the ignition lance can be custom manufactured according to the requirements of the burner.

D-ZL 411 Ex
Ignition lance with high-voltage cable for D-HG 400-53 Ex and D-HG 400-72 Ex

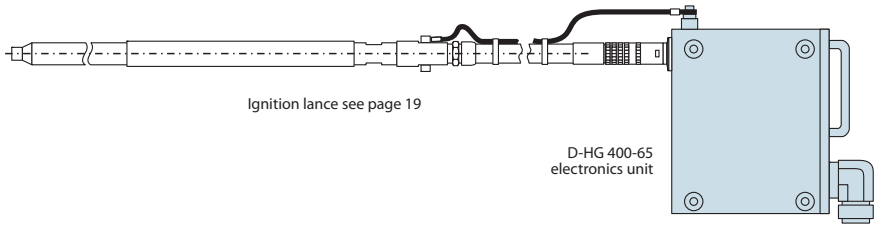
D-ZL 421
Ignition lance with high-voltage cable for D-HG 400-65

D-ZL 422
Ignition lance with high-voltage cable and handles for D-HG 400-65 for manual operation

D-ZL 423
Ignition lance with high-voltage cable for D-HG 400-65, with additional connector on the ignition lance

D-ZL 430
Ignition lance with high-voltage cable for Class I, Div. 1, Group A, B, C & D

D-ZL 431
Ignition lance with high-voltage cable for Class I, Div. 2 Group A, B, C & D.



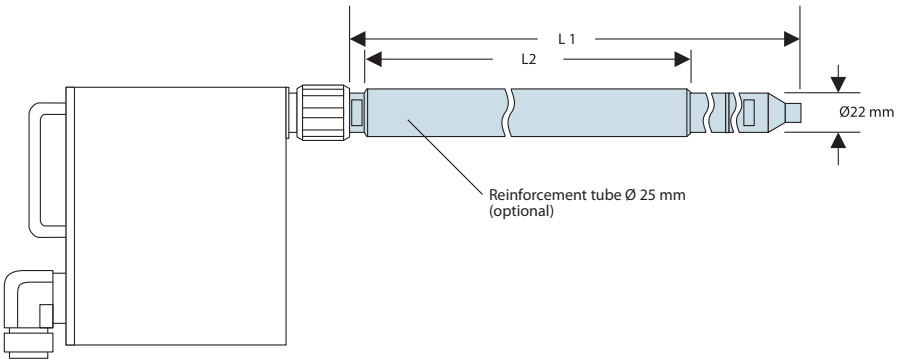
Ignition lance see page 19

D-HG 400-65
electronics unit

Mains voltage	115 / 230 VAC, 50 / 60 Hz or 24 / 48 VDC	Max. temperature of ignition tip	600°C permanent 800°C for short period (max. 2 min)
Switching performance	220 VA	Operational life of the ignition tip	10^6 ignition sparks
Ignition voltage / energy	1500 V / 4.5 J	Ignition frequency	20 sparks/s for 1 min. thereafter 5 sparks/s
Power-on time	300 s (Duty cycle 50%)	Dimensions	108 x 188 x 237 mm (LxWxH)
Perm. ambient temperature	-20…+60°C	Weight (approx.)	D-HG 400-50 with 3m lance: 9.0 kg D-HG 400-65: 4.5 kg D-HG 400-53 Ex: 40.0 kg D-HG 400-72 Ex: 13.0 kg D-HG 400-80: 9.0k g D-HG 400-81: 11.0 kg D-HG 400-90 with 3m lance: 9.0 kg D-ZL 4…: 1.6 kg/m
Protection	IP54		
Switching capacity	250 VAC / 4A		
Display	LED		

Ignition lances

Connection to ignition devices for the ignition of gas or liquid fuels in industrial burners of any capacity.



Features

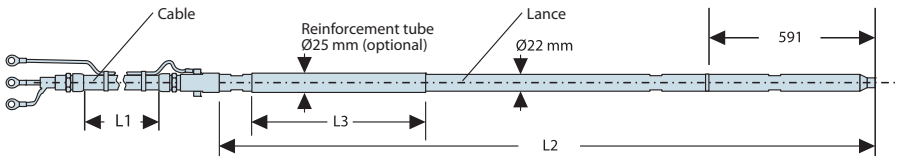
- Ignition tip temperature-proof up to 600°C, up to 800°C for a short period
- High-temperature model temperature-proof up to 1000°C.

Applications

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

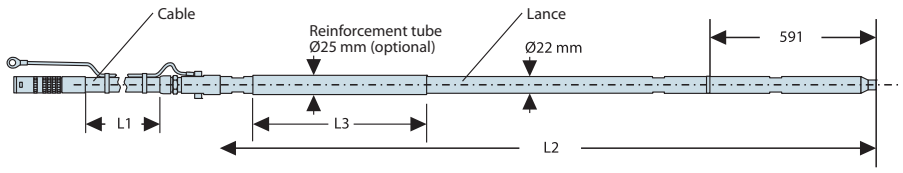
Ignition lance for D-HG 400-50, -51

Lance length L1	min. 0.7 m, max. 15 m	Weight	1.6 kg/m at Ø22 mm
Reinforcment tube length L2	max. L1-0.7 m		



D-ZL 411 Ex: separated ignition lance for D-HG 400-53 Ex / -72 Ex

Cable length L1	min. 1 m, max. 50 m	Reinforcement tube length L3	max. L2-0.7 m
Cable off-take angle at the lance	0° or 90°	Cable weight	0,5 kg + 0,5 kg/m
Lance length L2	min. 0.7 m, max. 15 m	Lance weight	1.6 kg/m at Ø22 mm



D-ZL 421: separated ignition lance for D-HG 400-65

Cable off-take at the device	0° or 90°	Reinforcement cable length L3	max. L2-0.7 m
Cable length L1	min. 1 m, max. 50 m	Cable weight	0.5 kg + 0.5 kg/m
Cable off-take at the lance	0° or 90°	Lance weight	1,6 kg/m at Ø22 mm
Lance length L2	min. 0,7 m, max. 15 m		

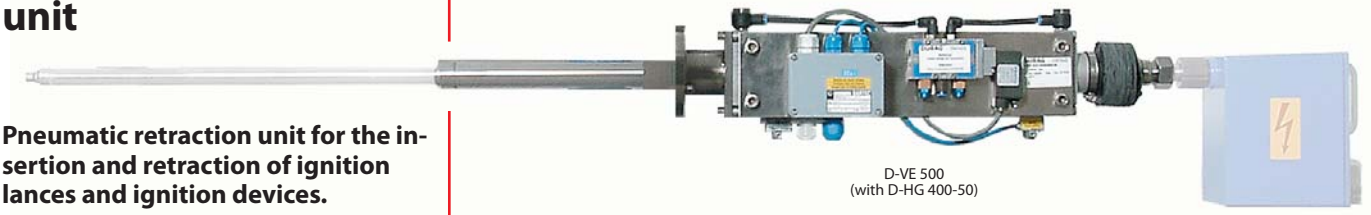
Special designs

D-ZL 421
As D-ZL 421 but with handles for lance

D-ZL 423
As D-ZL 421 but with lance plug-in connector

D-ZL 430/431
As D-ZL 421 but with lance outlet box, for Ex-range Class I, Div. 1/2.

Pneumatic retraction unit



D-VE 500
(with D-HG 400-50)

Pneumatic retraction unit for the insertion and retraction of ignition lances and ignition devices.

Features

- Automatic insertion and retraction of ignition lances
- Compressed air drive
- Direction change with solenoid valve
- Speed control
- Non-contact limit switch
- For use with ignition deviceses D-HG 400-50 and rigid ignition lances D-ZL...
- Available stroke lengths: 300, 400, 500 and 600mm
- Pressure-tight and/or explosion protected models also available
- Operational overpressure up to 10 bar.

Applications

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

Certification

- GOST-R
- PTB (ATEX).

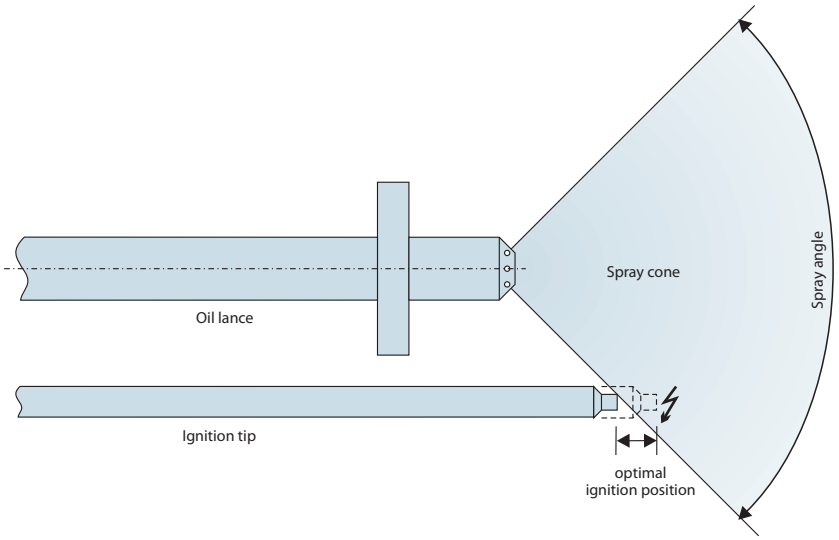
Functional description

Correct positioning of the ignition tip near the fuel/air mixture is a pre-requisite for reliable ignition of a burner with a high-energy ignition device. But temperatures in the optimal ignition zone are usually much too high during burner operation, resulting in possible damage to the ignition tip.

The pneumatic retraction mechanism assumes the task of positioning the ignition tip precisely into the ignition zone of the burner and retracting it again after successful ignition.

Accessories

- **Terminal box**
  for connecting solenoid valve and limit switch:
  - IP66 (normal environment)
  - IP65 (explosion protected model)
    Ex-protected: II 2 G Ex e ia IIC T6
- **Weather protection hoods**
  - for 300mm stroke
  - for 400mm stroke
  - for 500mm stroke
  - for 600mm stroke.



Max perm. operation overpressure	10 bar	Electric control	24/48 VDC or 115/230 VAC
Max. ambient temperature	-5…+50°C	Protection	IP65
Sheer force at 6 bar	1870 N	Display	LED
Retraction force at 6 bar	1682 N	Ex- protection limit switch NAMUR (optional)	II 2 G Ex ia IIC T4…T6
Weight (approx.)	300 mm stroke: 9.0 kg 400 mm stroke: 11.0 kg 500 mm stroke: 12.5 kg 600 mm stroke: 14.0 kg	Ex-solenoid valve (optional)	II 2 GD Ex m II T5

D-BT 0...

19" rack for front panel mounting of D-UG 660 control unit.

- For switching cabinet mounting in the inner area (IP00), e.g. hinged frame assembly
- Cable connection via 48-pin screwed multi-point socket connector
- Terminal connec from rear.

D-BT 043

Models

- **D-BT 013**
  Rack for **one** D-UG 660 control unit, 3RU, 24HP
- Dimensions
  178x132,5x213 mm (WxHxD)
  Weight 0.9 kg

- **D-BT 023**
  Rack for **two** D-UG 660 control units, 3RU, 42HP
- Dimensions
  269x132,5x213 mm (WxHxD)
  Weight 1.45 kg

- **D-BT 043**
  Rack for **four** D-UG 660 control units, 3RU, 84HP
- Dimensions
  482x132,5x213 mm (WxHxD)
  Weight 2.3 kg

D-BT 660...

B19"-rack for rear panel mounting of D-UG 660 control unit

- For switching cabinet mounting in the inner area (IP00), e.g. rear panel assembly
- Cable connection via connection terminals
- Clamp connection from front.

D-BT 660/2

Models

- **D-BT 660**
  Rack for **one** D-UG 660 control unit, 3RU, 24HP
- Dimensions
  171x149,5x215mm (WxHxD)
  Weight 0.8 kg

- **D-BT 660/2**
  Rack for **two** D-UG 660 control units, 3RU, 42HP
- Dimensions
  263x149,5x215 mm (WxHxD)
  Weight 1.25 kg

- **D-BT 660/4**
  Rack for **four** D-UG 660 control units, 3RU, 84HP
- Dimensions
  476x149,5x215 mm (WxHxD)
  Weight 2.1kg

D-UG 660 G66

19" field plastic housing, for D-UG 660 control unit

- For wall mounting in the outdoor area
- Cable connection via terminals in separate terminal box
- Protection IP55.

D-UG 660 G66/2

Models

- **D-UG 660 G66**
  Enclosure for **one** D-UG 660 control unit
- Dimensions
  135x149,5x250 mm (WxHxD)
  Weight 1.5 kg

- **D-UG 660 G66/2**
  Enclosure for **two** D-UG 660 control units
- Dimensions
  340x236x275 mm (WxHxD)
  Weight 3.65kg

D-BT 1...

19" metal field housing for D-UG 660 control unit

- For wall mounting in the outdoor area
- Cable connection via terminals in separate terminal box
- Protection IP55.

D-BT 142

Models

- **D-BT 142**
  Enclosure for **four** D-UG 660 control units
- Dimensions
  600x212x473 mm (WxHxD)

- **D-BT 182**
  Enclosure for **eight** D-UG 660 control units
- Dimensions
  600x345x473 mm (WxHxD)

D-ZS 140 / 141

Terminal box for D-LE... flame sensor and D-LX... compact flame monitor

- Protection IP65.

Models

- **D-ZS 140**
  for safe environments
- Dimensions
  105x105x66 mm (WxHxD)
  Weight 0.35 kg

- **D-ZS 140-12**
  12-pole version for D-LX 200/720

- **D-ZS 141**
  for potentially explosive atmospheres
  II 2G Ex e II T5/T6
- Dimensions
  110x75x55 mm (WxHxD)
  Weight 0.4 kg

D-ZS 087-20

Digital display for displaying the flame signal

- For optimal alignment of flame sensor with the ball flange and/or for displaying the configuration of flame sensor and switching device
- Display of the flame signal (pulse rate)
- Storing of minimum and maximum pulse rate values
- Voltage supply via the flame sensor.

- Dimensions 157x87x30 mm (WxHxD)
  Weight 0.3 kg

D-ZS 087-20

D-ZS 129-30/-40

LED bar graph display for the flame intensity

- Installation in 19“ frame
- 3RU/3HP
- Input 0/4...20 mA.

D-ZS 129-30

Models

- **D-ZS 129-30**
  Power supply 24 VDC
- Dimensions 15.2x128.4x107.5 mm (WxHxD)
  Weight 0.2 kg

- **D-ZS 129-40**
  Power supply 230VAC
- Dimensions 15.2x128.4x107.5 mm (WxHxD)
  Weight 0.2 kg

D-ZS 077-10

UV-C test light source for the functional test of flame sensors

- For the functional test of flame sensor models D-LE 103 UL, D-LE 603 UH/US and compact flame monitor D-LX 100 UL,
- Power Supply 230 VAC / 50 Hz.

- Dimensions 120x80x81.7 mm (WxHxD)
  Weight 0.65 kg

D-ZS 077-10

D-ZS 093

Combined test light source for the UV-A, UV-B and IR spectral range

- For the functional test of flame sensor models D-LE 603 UA/UAF/IS/IG/ISE/ISO, D-LE 701 UA/UAF/IS/IGA, D-LE 703 UA/UAF/ IS/IG, D-GT 800 UA/UAF, as well as compact flame monitors D-LX 100 UA/UAF/IS/IG and D-LX 200 UA/UAF/IG
- Power Supply 230 VAC / 50Hz.

- Dimensions 120x80x81.7mm (WxHxD)
  Weight 0.65 kg

D-ZS 093

D-ZS 118

Optical adjustment aid for alignment of the swivel mount on the sighting tube

- Dimensions L=200, Ø=87 mm
  Weight 0.5 kg

D-ZS 118

D-ZS 130

Fail-safe relay card

- Installation in 19“ rack/enclosure
- 3RU/10HP
- Power supply 24VDC
- Protection IP00.

- Dimensions 50.5x128x190.5 mm (WxHxD)
  Weight 0.25kg

D-ZS 130

D-NG 24/05

Power supply for D-UG 120 or D-LX 100.

- To supply two D-UG 120 switching devices or D-LX 100 and D-LX 200/720 compact flame monitors
- DIN-rail installation
- Input voltage 115/230VAC, output voltage (unregulated) 24 VDC / 0.5 A
- Protection IP20.

- Dimensions 70x75x118 mm (WxHxD) Weight 0.55 kg

D-NG 24/05

D-ZS 033

Swivel mount for flexible alignment of a flame sensor at the sighting tube of a burner.


D-ZS 033 I

Models

- **D-ZS 033 I for standard flame sensor,** G 1¼" thread
- Dimensions L=90, Ø=115 mm Weight 1.6 kg
- **D-ZS 033 III for Ex-flame sensor**, G 1" thread
- Dimensions L=160, Ø=115 mm Weight 3.4 kg
- other models on request.

D-ZS 114

Separable screw pipe connection for the installation of a D-LE 603…/94 Ex or a D-LE 603…/95 Ex on a standard port of a D-LE 603… flame sensor.


D-ZS 114

- Dimensions L=86, Ø=46 mm
- Weight=400 g
- Thread G 1"

D-ZS 117

Thermal isolator with electrical insulation for the isolation of the heat transfer and/or for electrical isolation between sighting tube and flame sensor.

Features

- Rigid up to 120°C.


D-ZS 117 I

Models

- **D-ZS 117 I for standard flame sensor,** G 1¼" thread
- Dimensions L=56, Ø=51mm Weight 0.05 kg
- **D-ZS 117 III for Ex-flame sensor**, G 1" thread
- Dimensions L=56, Ø=51 mm Weight 0.05 kg
- High-temperature model on request
- other models on request.

D-ZS 133

Ball valve for closing the sighting tube.

Recommended when removing the flame sensor at increased furnace pressure.


D-ZS 133 I

Models

- **D-ZS 133 I for standard flame sensor,** G 1¼" thread
- Dimensions L=216, Ø=58 mm Weight 1.4 kg
- **D-ZS 133 III for Ex-flame sensor**, G 1" thread
- Dimensions L=174, Ø=46 mm Weight 0.9 kg
- other models on request.

Requirements and Certifications

The DURAG GROUP, synonymous with a demand for high quality standards, has been ISO 9001 certified for years and has fully implemented its requirements. DURAG products are manufactured and tested in accordance with both European and international standards, such as:

- APAVE International (France)
- Australian Gas Association (AGA)
- DIN-CERTCO (German Industrial Guideline)
- Deutsche Vereinigung des Gas- und Wasserfaches e.V. (DVGW)
- Factory Mutual Research Cooperation (FM)
- GOST-R / GOSGORTECHNADZOR
- Physikalisch Technische Bundesanstalt (PTB)
- Underwriters Laboratories Inc. (UL).
- Underwriters Laboratories for Canada (C-UL)

Combustion technology stipulates that fuel may not enter the combustion chamber if safe combustion can not be guaranteed. If no flame is detected, the fuel supply must be closed, often within 1s. European and international regulations therefore specify a high degree of fail safety and reliability for equipment deployed.

Monitoring of the flame must also be unaffected by the construction of the furnace and its operational mode.

Requirements for flame monitoring and burner control (selection)

	Europe		USA		Canada	
Steam Boilers	**EN 12952** **EN 12953**	Water Tube Boilers Shell Boilers	**NFPA 85**	Boiler and Combustion Systems Hazards Code		
Firings	**EN 746** **90/396 EG**	Industrial Thermoprocessing Equipment EC Gas Appliance Directive	**NFPA 86**	Standard for Ovens and Furnaces		
Burner			**UL 726** **UL 795**	Oil-Fired Boiler Assemblies Commercial-Industrial Gas Heating Equipment		
Flame Monitors and Automatic Burner Control Devices	**EN 230** **EN 298** **EN 60730-2-5**	Automatic Burner Control Systems for Oil Fired Burners Automatic Burner Control Systems for Gas Fired Burners and Gas Burning Appliances with or without Fans Automatic Electrical Controls for Household Use and Similar Use	**UL 372** **FM Class 7610**	Primary Safety Controls for Gas- and Oil-Fired Appliances Combustion Safeguards and Flame Sensing Systems	**CSA 22.2. No. 199-M89**	Combustion Safety Controls and Solid-State Igniters for Gas- and Oil Burning Equipment
Functional safety	**IEC 61508**					

Certification of DURAG flame monitors and automatic burner controls

	D-IO 55	D-IR 55	D-UV 55	D-LX 100	D-LX 200 D-LX 720	D-UG 120 with D-LE...	D-UG 660 with D-LE...	D-GF 55	D-GF 150 with D-LE...
DVGW registered	●		●	●	●	●	●	●	●
APAVE	●			●		●	●		
UL 372	●	●	●	●		●	●	●	●
FM Class 7610	●	●	●	●		●	●	●	●
AGA AG 210				●			●		●
GOST-R				●		●	●		●
PTB (ATEX)				●		●*2	●*2		●*2
SIL3					●*1				

*1 optional *2 flame sensor D-LE 603...

Checklist for flame monitors

Plant details

Plant type (e.g. power station, claus plant, cement plant, waste incinerator, etc.): ……..

Burner layout (wall, opposed, corner, ceiling, floor, etc.): ……

Number of burners per plant: …… pcs

Load of individual burners: ……. MW

Number of burners, horizontal: …… pcs

Horizontal distance between burners: ……. m

Number of burners, vertical: …… pcs

Vertical distance between burners ……. m

Distance between flame and flame sensor: …… m

Sighting tube length: …… m, sighting tube diameter: …… mm

Expected flame length: …… m

furnace dimensions (LxWxH): ……. x ……. x ……. m

Burner type:
☐ Igniter ☐ Pilot burner
☐ Main burner ☐ Start-up/heat-up burner ☐ Fluidised bed burner
☐ Other……..

Fuels:
☐ Natural gas ☐ Gas, which: ……
☐ Light fuel oil ☐ Brown coal ☐ Anthracite
☐ Heavy fuel oil ☐ Other ……
Oil atomisation:
☐ Steam atomisation ☐ Air atomisation
☐ Pressure atomisation ☐ Other ……

Operational mode: ☐ Intermittent operation ☐ Continuous operation

Combustion: ☐ Low NO_x operation ☐ Exhaust recirculation
Other ……

Ambient temperature: minimum: ……°C maximum: ……°C

Flame monitor details

Flame monitor existing:
Type/Manufacturer …… /……

Flame monitor design:
☐ Flame sensor with separate control unit ☐ Compact flame monitor
☐ with fibre optic (rigid), length: …… m ☐ (flexible), length: …… m

Monitoring method:
☐ Burner selective ☐ Fuel selective
☐ Furnace monitoring ☐ Pilot burner selective

Approvals:
☐ SIL... ☐ FM
☐ UL ☐ DVGW-Certification ☐ APAVE
☐ AGA ☐ GOST-R ☐ other ……

Safety time (flame failure response time): …… s

Analogue output: ☐ 0…20 mA, ☐ 4…20mA,
Load: …… Ohm

Supply voltage: ☐ 24 VDC ☐ 115 VAC, 42-60 Hz ☐ 230 VAC, 42-60 Hz

IP-protection: Flame sensor: IP ……. Control unit: IP ……

Flame sensor connection: ☐ Cable gland ☐ Plug (not available for all)

Ex-protection compact flame monitor / Ex-protection flame sensor:
☐ II 2G Ex de IIC T5/T6 ☐ II 3G Ex nC IIC T5/T6
☐ Class I, Div. 1, Group B, C & D ☐ Class I, Div. 2, Group A, B, C & D

Ex-protection control unit: ☐ II 2G Ex de IIC T5/T6 ☐ II 2G Ex de IIB T5/T6
☐ Class I, Div. 1, Group B, C & D
Viewing window required ☐ yes

Installation/mounting: ☐ internal ☐ outdoor

Cable length at flame sensor: …… m
Cable length between flame sensor and control unit: …… m

Swivel mount required: ☐ yes
Thermal/electrical isolator required: ☐ yes
Ball valve required: ☐ yes

Sighting tube connection: G ……." thread NPT ……." thread
Position/line of sight to flame: ……

Rack: ☐ 19"-frame, ☐ Rear-wall mounting
Number of control units per rack: …… pcs

Wall enclosure: ☐ Metal ☐ Plastic

Number of control units per enclosure: ……. pcs

Additional information:

Burner drawing/boiler drawing available: ☐ yes (please attach copy)

DURAG

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

DVN – DURAG Vertrieb/Service Nord
Kollaustraße 105
22453 Hamburg · Germany
Tel.+49 (0)40 55 42 18-0
Fax+49 (0)40 58 41 54
E-Mail: dvn@durag.de

DVO – DURAG Vertrieb/Service Ost
Meißner Ring 4
09599 Freiberg · Germany
Tel.+49 (0)3731 30 04-0
Fax+49 (0)3731 30 04-22
E-Mail: durag.freiberg@durag.de

DVS – DURAG Vertrieb/Service Süd
Weidenweg 16
73087 Bad Boll · Germany
Tel.+49 (0)7164 912 25-0
Fax+49 (0)7164 912 25-50
E-Mail: info@dvs-badboll.de

DVW – DURAG Vertrieb/Service West
An der Pönt 53a
40885 Ratingen · Germany
Tel.+49 (0)2102 74 00-0
Fax+49 (0)2102 74 00 28
E-Mail: dvw@durag.de

DURAG France S.a.r.l.
Parc GIP Charles de Gaulle
49, rue Léonard de Vinci · BP 70166
95691 GOUSSAINVILLE CEDEX · France
Tel.+33 (0)1 301 811 80
Fax+33 (0)1 393 383 60
E-Mail: info@durag-france.fr

DURAG UK Office
Honeysuckle Cottage · Ridding Bank
Stoke on Trent
Staffordshire ST4 8SB · Great Britain
Tel.+44 (0)1782 657666
Fax+44 (0)1782 646020
E-Mail: durag.uk@durag.de

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
#143/16, Ground Floor, 4th Main Road
Industrial Town, Rajajinagar
Bengalooru 560 044 · India
Tel.+91 (0)80 23 14 56 26
Fax+91 (0)80 23 14 56 26 Ext. 30
E-Mail: info@duragindia.com

www.durag.de

Hegwein

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

SMITSVONK®

Smitsvonk Holland B.V.
P.O. Box 180 · 2700 AD Zoetermeer
Loodstraat 57 · 2718 RV Zoetermeer
The Netherlands
Tel.+31 (0)79 361 35 33
Fax+31 (0)79 361 13 78
E-mail: sales@smitsvonk.nl

VEREWA

VEREWA Umwelt- und Prozessmesstechnik GmbH
Kollaustraße 105
22453 Hamburg · Germany
Tel.+49 (0)40 55 42 18-0
Fax+49 (0)40 58 41 54
E-Mail: verewa@durag.de

DURAG process & systems technology

DURAG process & systems technology gmbh
Kollaustraße 105
22453 Hamburg · Germany
Tel.+49 (0)40 55 42 18-0
Fax+49 (0)40 58 41 54
E-Mail: info@durag-process.de