Product Overview
Combustion Technology
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 hazardous areas.
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) with a control unit. Where the flame sensor transforms characteristic properties of the flame into an electrical signal and the control unit 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-violent 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 monitoring gas and oil burners as well as combined gas/oil burners.

Features
- Monitoring of gas and oil burners of any load
- Suitable for intermittent operation and continuous operation (only AAL 75 POD)
- Simple installation on TS 35 DIN-rail

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

Certifications
- DVGW
- FM Class 7610
- EAC

Functional description
The flame monitor comprises of a control unit and flame sensor.
- Optical flame sensors generate a signal from the UV range of the flame radiation
- Flame sensors with an ionisation electrode process a current flowing through the flame

Models
- AAL 75
  Ionisation flame monitor for intermittent or continuous operation, also suitable for single electrode operation in conjunction with DURAG ignition transformers, model D-HG 55
- AAL 75
  as UV flame monitor in combination with D-LE 55 ULD-CG for the optical monitoring of gas flames in intermittent mode

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 AAL75/ D-LE 55 ULD-CG for functional test of the flame monitor, battery operated (D-ZS 091)
- Thermal isolator with electrical insulation for D-LE 55 ULD-CG flame sensor (D-ZS 117 III)

<table>
<thead>
<tr>
<th>Flame monitor (control unit)</th>
<th>Flame sensor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>AAL 75</td>
</tr>
<tr>
<td>Spectral Sensitivity</td>
<td>D-LE 55 ULD-CG: 190 – 270 nm</td>
</tr>
<tr>
<td>Operational mode</td>
<td>Intermittent operation</td>
</tr>
<tr>
<td>Electrical connection</td>
<td>115/230 VAC, 50/60 Hz</td>
</tr>
<tr>
<td>Perm. ambient temperature</td>
<td>-20°C bis +60°C</td>
</tr>
<tr>
<td>Perm. ambient temperature</td>
<td>-20°C to +60°C</td>
</tr>
<tr>
<td>FFDT (safety time)</td>
<td>1 s</td>
</tr>
<tr>
<td>Mounting</td>
<td>G 1” or G ½”</td>
</tr>
<tr>
<td>Display</td>
<td>LED</td>
</tr>
<tr>
<td>Protection</td>
<td>IP65</td>
</tr>
<tr>
<td>Dimensions</td>
<td>Ø 27 mm, length 116 mm</td>
</tr>
<tr>
<td>Weight</td>
<td>0.45 kg</td>
</tr>
<tr>
<td>Flame relay</td>
<td>2 relay outputs: 250 VAC/315 mA and 250 VAC/2 A</td>
</tr>
<tr>
<td>Installation</td>
<td>TS 35 DIN-rail</td>
</tr>
<tr>
<td>Dimensions</td>
<td>68x104x119 mm (WxHxD)</td>
</tr>
<tr>
<td>Weight</td>
<td>0.55 kg</td>
</tr>
</tbody>
</table>
Compact flame monitor

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

Features
- Suitable for intermittent operation as well as continuous operation
- 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.../94Ex for zone 1 and D-LX 100.../97Ex for zone 2)

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

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

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 °C to +60 °C

Electrical connection
- 24 VDC, 5 W, PELV
- Dimensions: 90x92 mm, length approx. 350 mm/ approx. 1.8 kg

Protection class
- IP67

Flame relay
- 1x NO contact, 230 VAC/ 2 A
- Purge air connection
- Dimensions: Ø 130 mm, length 313 mm approx. 4.3 kg

Status relay
- 1x NO contact, 230 VAC/ 2 A
- D-LX 100.../9xEx

FFDT (safety time)
- 1, 3, 5 s

Spectral ranges
- UV, VIS, IR

Viewing angle
- 6°

Number of ranges
- 1

Protection class
- IP65

Switching threshold
- 0 ... 9
- Dimensions: Ø 130 mm, length 313 mm approx. 4.3 kg
- Display
- LED display
- Sighting tube connection

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

Certifications
- SIL3
- DVGW
- UL 372
- FM Class 7610
- AGA: AS 4625
- EAC
- ATEX
Compact flame monitor

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

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
- FM Class 7610
- CSA
- SIL3
- EAC
- AGA: AS 4625
- ATEX, IECEx
- Marine Certifications

Functional description
The D-LX 200 compact flame monitor analyses flame radiation using the integrated flame sensor signal. Current output 0/4 ... 20 mA available for further analysis. Flame properties and parameters of the flame monitor can be transmitted to a PC via a RS485 and an IrDA interface.

Accessories
- Optical adjustment aid for the swivel mount on the sighting tube (D-ZS 118)
- LED bar graph display for the flame intensity (D-ZS 129)
- Swivel mount for aligning the flame monitor
- Thermal isolator with electrical insulation
- Ball valve for closing the sighting tube
- 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)

Operational mode
Intermittent operation and continuous operation

Safety
Self-monitoring and fail-safe

Electrical connection
24 VDC, 5 W, PELV

Protection class
IP66/68, IP65 (MP)

Flame relay
1x NO contact, 24 VDC, 0.5 A

Status relay
1x NO contact, 24 VDC, 0.5 A

FFDT (safety time)
1, 2, 3, 5 s

Viewing angle
6°

Ranges
2

Communication
LED, Modbus RTU, IrDA

Analogue output
0/4 ... 20 mA

Protection class
IP66

Ambient temperature range
-40°C to +85°C

Dimensions
85x85 mm, length approx. 250 mm approx. 1.25 kg

Weight
ca. 3.2 kg

Sighting tube connection
G 1¼" or 1½" NPT(F)

Tmax (/86Ex, /87Ex)
+65°C

Certifications
- DVGW
- FM Class 7610
- CSA
- SIL3
- EAC
- AGA: AS 4625
- ATEX, IECEx
- Marine Certifications
Flame sensor

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

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 control 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
- SIL 3

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)

Flame sensor selection

<table>
<thead>
<tr>
<th>Flame sensor</th>
<th>Gas</th>
<th>Oil</th>
<th>Coal</th>
<th>Wood</th>
</tr>
</thead>
<tbody>
<tr>
<td>D-LE 103 UL</td>
<td>++</td>
<td>+</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D-LE 103 UAF</td>
<td>o</td>
<td>++</td>
<td>o</td>
<td>+</td>
</tr>
<tr>
<td>D-LE 103 UA</td>
<td>+</td>
<td>++</td>
<td>o</td>
<td>+</td>
</tr>
<tr>
<td>D-LE 103 IS</td>
<td>!</td>
<td>++</td>
<td>++</td>
<td>+</td>
</tr>
<tr>
<td>D-LE 103 IG</td>
<td>o</td>
<td>++</td>
<td>++</td>
<td>++</td>
</tr>
</tbody>
</table>

++ 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°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 1 1/4”

High-pass filter

Pre-set

Purge air connection

G 1 1/8”

Spectral ranges

- UV, VIS, IR

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 and 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**

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

**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 .../97 Ex 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
- SIL 3

**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)

**Flame sensor selection**

<table>
<thead>
<tr>
<th>Flame sensor</th>
<th>Suitability for fuels</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>D-LE 603 UH</td>
<td>++ o</td>
<td>selective single burner monitoring in multiple-burner plants</td>
</tr>
<tr>
<td>D-LE 603 US</td>
<td>++</td>
<td>at low UV radiation</td>
</tr>
<tr>
<td>D-LE 603 UAF</td>
<td>o ++</td>
<td>with intensive ambient light (neighbouring burners), gain switch-over</td>
</tr>
<tr>
<td>D-LE 603 UA</td>
<td>+ ++ + o</td>
<td>at low NOx component, gain switch-over</td>
</tr>
<tr>
<td>D-LE 603 UI</td>
<td>++ ++ ++ +</td>
<td>remote changeover of spectral sensitivity</td>
</tr>
<tr>
<td>D-LE 603 IS</td>
<td>! + ++</td>
<td>selective single burner monitoring (coal, oil)</td>
</tr>
<tr>
<td>D-LE 603 IG</td>
<td>o ++ ++</td>
<td>selective single burner monitoring (coal, oil, wood)</td>
</tr>
<tr>
<td>D-LE 603 ISF</td>
<td>! ++</td>
<td>dual-channel flame sensor (LOG/LOG)</td>
</tr>
<tr>
<td>D-LE 603 ISO</td>
<td>! ++</td>
<td>dual-channel flame sensor (LIN/LOG)</td>
</tr>
</tbody>
</table>

**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”
- G 1½”

**Protection class**

- with cable gland (D-LE 603 ... -CG) IP65 with axial plug (D-LE 603 ... -P) IP67
- D-LE 603 .../94Ex
- D-LE 603 .../95Ex
- Protection class IP65
- /94Ex
- /95Ex
- /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 nA nC IIC T6

**Gain**

- four settings

**High-pass filter**

- three settings

**Spectral ranges**

- UV, VIS, IR
- 340Ex / 395Ex
- Dimensions
- Ø 130 mm, length 313 mm approx. 4.3 kg

**Viewing angle**

- 6°

**Perm. ambient temperature**

- -20 °C to +60 °C
- Sighting tube connection G 1¼” (94Ex / 95Ex)
- G 1½” (94Ex / 97Ex)

**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
- SIL 3

**Flame sensor Suitability for fuels**

- Gas
- Oil
- Coal
- Wood

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

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

<table>
<thead>
<tr>
<th>Flame sensor</th>
<th>Suitability for fuels</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>D-LE 701 / 703 UAF</td>
<td>o ++</td>
<td>with intensive ambient light (neighbouring burners), gain switchover</td>
</tr>
<tr>
<td>D-LE 701 / 703 UA</td>
<td>+ ++ +</td>
<td>with low NOx component, gain switchover</td>
</tr>
<tr>
<td>D-LE 701 / 703 IS</td>
<td>++ + ++</td>
<td>selective single burner monitoring (coal, oil)</td>
</tr>
<tr>
<td>D-LE 701 IGA / 703 IG</td>
<td>o + ++ ++</td>
<td>selective single burner monitoring (coal, oil, wood)</td>
</tr>
</tbody>
</table>

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

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

<table>
<thead>
<tr>
<th>D-LE 703 flame sensor</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Operation mode</td>
<td>Intermittent operation, continuous operation and 72-hour operation without permanent supervision</td>
</tr>
<tr>
<td>Safety</td>
<td>Self-monitoring and fail-safe</td>
</tr>
<tr>
<td>Protection</td>
<td>with cable gland (D-LE 703 ... -CG) IP65 with axial plug (D-LE 703 ... -P) IP67</td>
</tr>
<tr>
<td>Gain</td>
<td>four settings</td>
</tr>
<tr>
<td>High-pass filter</td>
<td>three settings</td>
</tr>
<tr>
<td>Spectral ranges</td>
<td>UV, VIS, IR</td>
</tr>
<tr>
<td>Perm. ambient temperature</td>
<td>-20 °C to +60 °C</td>
</tr>
<tr>
<td>Dimensions Weight</td>
<td>90x92 mm, length approx. 270 mm approx. 1.2 kg</td>
</tr>
</tbody>
</table>
Compact flame monitor with fibre optic system

Application with
- flexible fibre optic system
  D-LX 720
- or rigid fibre optic system
  D-LX 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 where ambient temperature near the sighting tube is too high
- Power stations
- Chemical industry
- Refineries
- Cement plants
- Waste incinerators
- Steam generators
- Heating plants

Certifications
- DVGW
- FM Class 7610
- CSA
- SIL3
- EAC
- AGA: AS 4625
- ATEX, IECEx
- Marine Certifications

Functional description

The D-LX 720 compact flame monitor is electronically identical to the D-LX 200. It analyses flame radiation using the integrated flame sensor signal. Current output 0/4 ... 20 mA available for further analysis. Flame properties and parameters of the flame monitor can be transmitted to a PC via a RS485 and an IrDA interface.

Accessories
- LED bar graph display for the flame intensity (D-ZS 129)
- D-LX 200 Test Kit for performing software supported tests
- 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)

Operational mode
- Intermittent operation and continuous operation

Threshold switches
- Flame intensity and flicker frequency

Safety
- Self-monitoring and fail-safe

Electrical connection
- 24 VDC, 5 W, PELV
- Protection class: IP66/68, IP65 (IMP)
- Flame relay: 1x NO contact, 24 VDC, 0.5 A
- Status relay: 1x NO contact, 24 VDC, 0.5 A
- FFDT (safety time): 1, 2, 3, 5 s

Ranges
- 2

Communication
- LED, Modbus RTU, IrDA

Analogue output
- 0/4 ... 20 mA

Protection class
- IP66

Dimensions
- Ø120 mm, length 229 mm approx. 1.25 kg
- Dimensions Ø120 mm, length 229 mm

Weight
- approx. 1.25 kg
- ca. 3.2 kg

Spectral ranges
- UV, IR

Protection class
- IP66

Weight
- ca. 3.2 kg

FFDT (safety time)
- 1, 2, 3, 5 s

Ranges
- 2

Certifications
- DVGW
- FM Class 7610
- CSA
- SIL3
- EAC
- AGA: AS 4625
- ATEX, IECEx
- Marine Certifications

D-LX 720.../87Ex

DURAG GROUP

smart solutions for combustion and environment
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

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

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

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

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

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 photodiodes for optimal selectivity when using different fuels.

Models
- Cable gland connection (-Ex)
- Axial plug (-P)
- Available with or without cooling for very high temperatures (D-GT 800)

Accessories
- UV-A, UV-B and IR test light source
- Terminal box for connecting the flame sensor (D-ZS 140, D-ZS 141)

Flame sensor selection

<table>
<thead>
<tr>
<th>Flame sensor</th>
<th>Suitability for Gas</th>
<th>Suitability for Oil</th>
</tr>
</thead>
<tbody>
<tr>
<td>D-GT 800/801 UAF</td>
<td>o</td>
<td>++</td>
</tr>
<tr>
<td>D-GT 800/801 UA</td>
<td>+</td>
<td>++</td>
</tr>
</tbody>
</table>

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

Operational mode
- D-GT 800/801
  - 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
- 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/T5S/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 monitoring gas, oil and coal flames with DURAG UV, UV+IR or IR flame sensors, primarily in single burner view applications.

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)

Operation mode

- Intermittent operation, continuous operation, 72-hour operation without permanent supervision

Configurable switching thresholds

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

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)

Operation mode

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

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
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)

<table>
<thead>
<tr>
<th>Operational mode</th>
<th>Flame sensor</th>
<th>Display</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intermittent operation, continuous operation, 72-hour operation without permanent supervision</td>
<td>1, 2 parallel or external flame</td>
<td>LED</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Safety</th>
<th>Flame intensity</th>
<th>0/4 ... 20 mA</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Electrical connection</th>
<th>Data output</th>
<th>to D-AM 150/ D-ZS 087-20</th>
</tr>
</thead>
<tbody>
<tr>
<td>115/230 VAC, 50/60 Hz</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Protection</th>
<th>Dimensions Weight</th>
<th>170x130x114 mm (WxHxD) approx. 1.5 kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP20</td>
<td>Weight</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Perm. ambient temperature</th>
<th>D-GF 150-MB</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>-20°C to +60°C</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Installation</th>
<th>Display</th>
<th>Text display of status, program step and errors</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIN-rail TS 35</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Threshold setting</th>
<th>Data output</th>
<th>Direct Modbus port</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 ... 9</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Pre-purge                        |                   |                                             |
| 30 s ... 20 min                  |                    |                                             |
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.

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)

Operational mode
- Intermittent operation, continuous operation, 72-hour operation without permanent supervision

Installation
- DIN-rail TS 35

Dimensions
- 170x130x114 mm (WxHxD)

Safety
- First out annunciator: fail-safe

Weight
- approx. 1.2 kg

Electrical connection
- 115/230 VAC, 50/60 Hz

Display
- Alpha-numeric LCD display

Protection
- IP20

Perm. ambient temperature
- -20°C to +60°C

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

Features

- Controlling and monitoring of gas and oil burners of any capacity
- Suitable for intermittent operation (D-GF 75-10) and continuous operation (D-GF 75-20)
- Integrated ionisation flame monitor
- Input for external flame monitor
- Adjustable pre-purge time
- Adjustable safety times
- Optional recycling after flame loss in operation position

Applications

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

Certifications

- DVGW
- EAC

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 pre-purge of the boiler with optional air pressure check
- 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 is extinguished whilst the burner is in operation, an interlock is activated.

Operational mode

<table>
<thead>
<tr>
<th>Operational mode</th>
<th>D-GF 75-10: Intermittent operation and continuous operation</th>
<th>Start-up safety time</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>3, 5, 10 or 15 s</td>
</tr>
<tr>
<td>Pre-purge time</td>
<td></td>
<td>0, 30, 60 or 120 s</td>
</tr>
<tr>
<td>Safety</td>
<td>Self-monitoring and fail-safe</td>
<td>1, 2, 3 or 5 s</td>
</tr>
<tr>
<td>Electrical connection</td>
<td>115/230 VAC, 50/60 Hz</td>
<td>Flame intensity</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0 ... 50 µA</td>
</tr>
<tr>
<td>Protection</td>
<td>IP20</td>
<td>Display</td>
</tr>
<tr>
<td></td>
<td></td>
<td>LED</td>
</tr>
<tr>
<td>Perm. ambient temperature</td>
<td>-20°C to +60°C</td>
<td>Dimensions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>91x103x118 mm (WxHxD)</td>
</tr>
<tr>
<td>Flame sensor</td>
<td>- Ionisation electrode</td>
<td>Weight</td>
</tr>
<tr>
<td></td>
<td>- External flame monitor</td>
<td>approx. 1 kg</td>
</tr>
<tr>
<td>Installation</td>
<td>DIN-rail TS 35</td>
<td></td>
</tr>
</tbody>
</table>
Electronic ignition transformer

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

Features

- Ignition of oil and gas
- High-performance and reliable ignition
- Simple to use and install
- 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 85

Applications

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

Certifications

- EAC

Functional description

A 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 HEGWEIN AAL 75 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

Electrical connection

115/230 VAC, 50/60 Hz

Perm. ambient temperature

-20°C to +60°C

Power consumption

15 VA

Protection

IP55

Ignition voltage

5000 V

Dimensions

100x100x80 mm (LxWxD) (without ignition electrode)

Duty cycle

max 300 s (Duty cycle 50%)

Weight

approx. 0.7 kg
High energy ignition
The high energy ignition devices of the D-HG 400 and D-HG 500 series are suitable for the ignition of gas or liquid fuels in industrial burners of any capacity.

Features
- Reliable ignition of gaseous fuels
- Ignition of liquid fuels, up to heavy oil grade 6
- Suitable as "Ignitor Class 3 Special" in accordance with NFPA 85
- Compact set-up with integrated ignition lance
- Separated set-up of ignition device and ignition lance for safe and hazardous areas
- Thyristor controlled and therefore non-wearing electronic
- Ignition feedback signal via potential-free relay output
- LED indication at device
- Integrated protection and control functionalities

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

Certifications
- ATEX/IECEx
- EAC

Function
At the high energy igniters D-HG 400 and D-HG 500 a high-voltage capacitor is discharged and a spark is created at the ignition lance’s tip. The spark discharge is triggered by a non-wearing switch (thyristor). Every spark produces – depending on the model – an energy of up to 5.6 Joule at a maximum ignition frequency of 20 sparks per second.

Capacity types
- **D-HG 400**
  Ignition feedback signal via LED at the device and potential-free relay output to the control room, maximum ignition energy of 90 Joule at a maximum ignition frequency of 20 sparks per second
- **D-HG 500**
  Ignition feedback and status signal via LEDs at the device and potential-free relay outputs to the control room, maximum ignition energy of 112 Joule at a maximum ignition frequency of 20 sparks per second
- **D-HG 550**
  As D-HG 500 but with the additional possibility for customizing of parameters and optional available control functionalities (via software D-ESI 100 by user or DURAG-Service)

Models
- **D-HG ...-50**
  Compact set-up, electronics and ignition lance are one unit
- **D-HG ...-51**
  Compact set-up as D-HG ...-50 with push-button for manual ignition
- **D-HG ...-52**
  Compact set-up as D-HG ...-50 with separated connections for signalling and power supply
- **D-HG ...-60**
  Separated set-up for safe areas: Electronic unit and ignition lance are connected by a high voltage cable
- **D-HG ...-61**
  Separated set-up as D-HG...-60 with push-button for manual ignition
- **D-HG ...-62**
  Separated set-up as D-HG...-60 with separated connections for signalling and power supply
- **D-HG ...-..Ex**
  Separated set-up for potentially explosive atmospheres 1&21 (ATEX)
- Optional
  Customized and project specific versions with flexible ignition lances for tilting burners

Technical Specifications

<table>
<thead>
<tr>
<th>Electrical connection</th>
<th>115 VAC / 230 VAC, 48-60 Hz</th>
<th>Perm. ambient temperature</th>
<th>D-HG 400: -20° C to +60° C, D-HG 5x0: -40° C to +80° C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power consumption</td>
<td>200 VA</td>
<td>Display</td>
<td>LEDS (Ignition feedback, status [only D-HG 5x0])</td>
</tr>
<tr>
<td>Ignition voltage</td>
<td>1500 V</td>
<td>Protection</td>
<td>IP65 (D-HG ...-5x/-6x)</td>
</tr>
<tr>
<td>Initiation energy/second (max)</td>
<td>D-HG 400: 90 J, D-HG 5x0: 112 J</td>
<td>Dimension</td>
<td>D-HG-5x/6-6x</td>
</tr>
<tr>
<td>Ignition frequency</td>
<td>Max 20 sparks/ second</td>
<td>Weight (appr., without ignition lances)</td>
<td>D-HG ...-5x/6x: 4.5 kg, D-HG ...-7Ex: 16 kg, D-HG ...-9Ex: 18 kg</td>
</tr>
<tr>
<td>Power on time</td>
<td>50 %</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

DURAG GROUP smart solutions for combustion and environment
Ignition lances

For the connection to the high energy ignition devices of the D-HG 400 and D-HG 500 series in order to ignite gas or liquid fuels in industrial burners of any capacity – also in hazardous areas.

Features

- Flexible customization for specific installation conditions by various combinations of components
- Easily replaceable ignition tips – available as normal or high temperature-proof models
- Special ignition tips for the ignition of HFO or at high pressure
- Ignition lance lengths up to 15 meter
- Up to 50 m distance can be overcome by using robust high voltage cables – without any loss of performance!
- Compatible with retraction units D-VE 500

Applications

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

Certifications

- ATEX/IECEx
- EAC

---

### D-ZL 500 - directly mounted at D-HG ...-50/-51/-52

<table>
<thead>
<tr>
<th>Length ignition lance LZL</th>
<th>Min 0.7 m, max 15 m (grid dimension: 100 mm)</th>
<th>Weight ignition lance</th>
<th>1.6 kg/m at Ø 22mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diameter ignition lance</td>
<td>Standard: 22 mm Others on request</td>
<td>Operational life of ignition tip</td>
<td>10⁶ sparks</td>
</tr>
<tr>
<td>Max temperature ignition tip</td>
<td>Normal temperature (NT): 600 °C, briefly 800 °C High temperature (HT): Up to 1000 °C</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### D-ZL 521 - separted ignition lance for D-HG ...-60/-61/-62

<table>
<thead>
<tr>
<th>Length ignition lance LZL</th>
<th>Min 0.7 m, max 15 m (grid dimension: 100 mm)</th>
<th>Weight ignition lance</th>
<th>1.6 kg/m at Ø 22mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length high voltage cable LHV</td>
<td>Min 3 m, max 50 m (grid dimension: 5 m)</td>
<td>Weight high voltage cable</td>
<td>0.5 kg + 0.5 kg/m</td>
</tr>
<tr>
<td>Diameter ignition lance</td>
<td>Standard: 22 mm Others on request</td>
<td>Operational life of ignition tip</td>
<td>10⁶ sparks</td>
</tr>
<tr>
<td>Max temperature ignition tip</td>
<td>Normal temperature (NT): Up to 600 °C, briefly 800 °C High temperature (HT): Up to 1000 °C</td>
<td>Cable take-off</td>
<td>At side of device: 0°/ 90° At side of lance: 0°/ 90°</td>
</tr>
</tbody>
</table>

### D-ZL 441Ex - connectable to D-HG ...-Ex for hazardous areas

<table>
<thead>
<tr>
<th>Length ignition lance LZL</th>
<th>Min 0.7 m, max 15 m (grid dimension: 100 mm)</th>
<th>Weight ignition lance</th>
<th>1.6 kg/m at Ø 22mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length high voltage cable LHV</td>
<td>Min 3 m, max 50 m (grid dimension: 5 m)</td>
<td>Weight high voltage cable</td>
<td>0.5 kg + 0.5 kg/m</td>
</tr>
<tr>
<td>Diameter ignition lance</td>
<td>Standard: 22 mm Others on request</td>
<td>Operational life of ignition tip</td>
<td>10⁶ sparks</td>
</tr>
<tr>
<td>Max temperature ignition tip</td>
<td>Normal temperature (NT): Up to 600 °C, briefly 800 °C High temperature (HT): Up to 1000 °C</td>
<td>Cable take-off</td>
<td>At side of device: 0°/ 90° At side of lance: 0°/ 90°</td>
</tr>
<tr>
<td>Ex protection (ATEX/IECEx)</td>
<td>II 2G Ex d IIC T6, T5, T4 Gb II 2D Ex tb IICT80, 95, 130 °C Db IP65</td>
<td>Perm. ambient temperature</td>
<td>-40 °C to +80 °C</td>
</tr>
</tbody>
</table>
Pneumatic retraction unit

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 device D-HG 400-5x / 5x0-5x or ignition lances ZL 441Ex / 521
- Available stroke lengths: 300, 400, 500 and 600 mm
- 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
- EAC
- ATEX

Functional description
Correct positioning of the ignition tip at the edge of 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-protection: II 2 G Ex e ia IIC T6
- Weather protection hoods
  - for 300 mm stroke
  - for 400 mm stroke
  - for 500 mm stroke
  - for 600 mm stroke

Ex-solenoid valve (optional)
II 2 GD Ex m II TS

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max perm. pressure of instrument air</td>
<td>10 bar</td>
<td>Electrical connection: 24/48 VDC or 115/230 VAC</td>
</tr>
<tr>
<td>Max ambient temperature</td>
<td>-5°C to +40°C, others on request</td>
<td>Protection: IP65</td>
</tr>
<tr>
<td>Sheer force at 6 bar</td>
<td>1870 N</td>
<td>Display: LED</td>
</tr>
<tr>
<td>Retraction force at 6 bar</td>
<td>1682 N</td>
<td>Ex-protection limit switch NAMUR (optional): II 2 G Ex ia IIC T4...T6</td>
</tr>
</tbody>
</table>
| Weight (approx.)               | 300 mm stroke: 8.0 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 TS |
**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 multipoint socket connector
- Terminal connection from rear

**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

**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: 2.1 kg

**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

**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: 3.65 kg

**D-ZS 140/ 141**

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

- Protection IP65

**Models**

- **D-ZS 140**
  - 8-pole version for safe environments
  - Dimensions: 105x105x66 mm (WxHxD), Weight: 0.35 kg

- **D-ZS 140-12**
  - 12-pole version for D-LX 200/720
  - Dimensions: 110x75x55 mm (WxHxD), Weight: 0.4 kg

- **D-ZS 141**
  - 8-pole version for potentially explosive atmospheres II 2G
  - Dimensions: 110x75x55 mm (WxHxD), Weight: 0.4 kg

- **D-ZS 141-12**
  - 12-pole version for D-LX 200/720
  - 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 129-30/ -40
LED bar graph display for the flame intensity
- Installation in 19° frame
- 3RU/ 3HP
- Input 0/4 ... 20 mA

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
- Electrical connection 230 VAC/ 50 Hz

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/SE/SO, 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
- Electrical connection 230 VAC/ 50 Hz

D-LX 200 Test kit
For software supported tests of the compact flame monitors D-LX 200/ 720, including printed output of protocols for documentation
- Set containing a test light source and relay tester, software D-LX 200 InformationCentre
- Mobile use, including robust transport case
- Electrical connection 100-240 VAC/ 50-60 Hz

D-ZS 118
Optical adjustment aid for alignment of the swivel mount on the sighting tube

D-ZS 130
Fail-safe relay card
- Installation in 19° rack/ enclosure
- 3RU/ 10HP
- Electrical connection 24VDC
- Protection IP00
D-NG 24/05

Power supply for D-UG 120, D-LX 100 or D-LX 200

- 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 115/230 VAC, output voltage (unregulated) 24 VDC/0.5 A
- Protection IP20

D-ZS 033

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

- \( T_{\text{max}} = 180^\circ \text{C} \)

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 117/ D-ZS 117 HT

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, HT up to 180 °C

D-ZS 133

Ball valve for closing the sighting tube

Recommended when removing the flame sensor at increased furnace pressure

- \( T_{\text{max}} = 150^\circ \text{C} \)
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)
- Deutsche Vereinigung des Gas- und Wasserfaches e.V. (DVGW)
- Factory Mutual Research Cooperation (FM)
- EAC
- ATEX
- Underwriters Laboratories Inc. (UL)
- Underwriters Laboratories for Canada (C-UL)

Combustion technology stipulates that fuel may not enter the combustion chamber if safe combustion cannot 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)

<table>
<thead>
<tr>
<th></th>
<th>Europe</th>
<th>USA</th>
<th>Canada</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steam Boilers</td>
<td>EN 12952</td>
<td>Water Tube Boilers</td>
<td>NFPA 85</td>
</tr>
<tr>
<td></td>
<td>EN 12953</td>
<td>Shell Boilers</td>
<td></td>
</tr>
<tr>
<td>Firing</td>
<td>EN 746</td>
<td>Industrial Thermoprocessing Equipment</td>
<td>NFPA 86</td>
</tr>
<tr>
<td></td>
<td>2009/142/EG</td>
<td>EC Gas Appliance Directive</td>
<td></td>
</tr>
<tr>
<td>Burner</td>
<td>UL 726</td>
<td>Oil-Fired Boiler Assemblies Commercial-Industrial Gas Heating Equipment</td>
<td></td>
</tr>
<tr>
<td></td>
<td>UL 795</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flame Monitors and Automatic Burner Control Devices</td>
<td>EN 298</td>
<td>Automatic burner control systems for burners and appliances burning gaseous and liquid fuels</td>
<td>UL 372</td>
</tr>
<tr>
<td></td>
<td>EN 60730-2-5</td>
<td>Automatic Electrical Controls for Household Use and Similar Use</td>
<td>FM Class 7610</td>
</tr>
<tr>
<td>Functional safety</td>
<td>IEC 61508</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# Questionnaire for Selection of Flame Monitors (1/2)

<table>
<thead>
<tr>
<th><strong>Customer/ Partner</strong></th>
<th><strong>Date</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Contact person</strong></th>
<th><strong>Preferred contact method</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>○ Tel. ○ Email</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Project</strong></th>
<th><strong>Tel.</strong></th>
<th><strong>Email</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

## Plant Details

<table>
<thead>
<tr>
<th><strong>Plant type</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Load of individual burners</strong></th>
<th><strong>MW</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Burner layout</strong></th>
<th><strong>Front</strong></th>
<th><strong>Boxer</strong></th>
<th><strong>Corner</strong></th>
<th><strong>Ceiling</strong></th>
<th><strong>Floor</strong></th>
<th><strong>Others</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Number of burners at plant</strong></th>
<th><strong>pcs</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Alignment of burners</strong></th>
<th><strong>pcs vertical</strong></th>
<th><strong>pcs horizontal</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Distance between burners</strong></th>
<th><strong>m vertical</strong></th>
<th><strong>m horizontal</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Dimensions of furnace (LxWxH)</strong></th>
<th><strong>m</strong></th>
<th><strong>x</strong></th>
<th><strong>m</strong></th>
<th><strong>x</strong></th>
<th><strong>m</strong></th>
</tr>
</thead>
<tbody>
<tr>
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</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Distance btw. flame &amp; flame monitor</strong></th>
<th><strong>Expected flame length</strong></th>
<th><strong>m</strong></th>
<th><strong>Expected flame length</strong></th>
<th><strong>m</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Sighting tube length</strong></th>
<th><strong>m</strong></th>
<th><strong>Sighting tube diameter</strong></th>
<th><strong>mm</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Burner type</strong></th>
<th><strong>Igniter</strong></th>
<th><strong>Pilot burner</strong></th>
<th><strong>Main burner</strong></th>
<th><strong>Start-up/ heat-up burner</strong></th>
<th><strong>Fluidized bed burner</strong></th>
<th><strong>Others</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

## Specification of Fuel and Process

<table>
<thead>
<tr>
<th><strong>Fuels</strong></th>
<th><strong>Gas</strong></th>
<th><strong>Coal</strong></th>
<th><strong>Oil</strong></th>
<th><strong>Others</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>For oil: type of atomization</strong></th>
<th><strong>Steam</strong></th>
<th><strong>Air</strong></th>
<th><strong>Pressure</strong></th>
<th><strong>Others</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</table>

<table>
<thead>
<tr>
<th><strong>Operational mode</strong></th>
<th><strong>Intermittent</strong></th>
<th><strong>Continuous</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</table>

<table>
<thead>
<tr>
<th><strong>Combustion</strong></th>
<th><strong>Low NOx</strong></th>
<th><strong>Exhaust recirculation</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</table>

<table>
<thead>
<tr>
<th><strong>Required accessory</strong></th>
<th><strong>Burner control</strong></th>
<th><strong>Ignition device</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
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</table>

## Environmental Conditions

<table>
<thead>
<tr>
<th><strong>Ambient temperature</strong></th>
<th><strong>Minimum</strong></th>
<th><strong>°C</strong></th>
<th><strong>Maximum</strong></th>
<th><strong>°C</strong></th>
<th><strong>Average</strong></th>
<th><strong>°C</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Area of installation</strong></th>
<th><strong>Indoor</strong></th>
<th><strong>Outdoor</strong></th>
<th><strong>Off-Shore</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

## Required Certifications/ Type Approvals

<table>
<thead>
<tr>
<th><strong>DVGW</strong></th>
<th><strong>ATEX</strong></th>
<th><strong>IECEx</strong></th>
<th><strong>FM</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>UL</strong></th>
<th><strong>AGA</strong></th>
<th><strong>GOST</strong></th>
<th><strong>Others</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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</tbody>
</table>

## Attached Documents

<table>
<thead>
<tr>
<th><strong>Fuel composition</strong></th>
<th><strong>Furnace/ burner drawing</strong></th>
<th><strong>Climate conditions</strong></th>
<th><strong>Others</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

---

(LxWxH)
## Questionnaire for Selection of Flame Monitors (2/2)

### Flame Monitor Details

<table>
<thead>
<tr>
<th>Make</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Flame Monitor Requirements

<table>
<thead>
<tr>
<th>Flame monitor design</th>
<th>Fiber optic version</th>
<th>m rigid length</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ Flame sensor with separate control unit</td>
<td>□ Yes</td>
<td>□ No</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Planned sensor type</th>
<th>Expected wave length</th>
<th>Monitoring mode</th>
<th>FFDT (safety time)</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ UV</td>
<td>□ IR</td>
<td>□ UV&amp;IR</td>
<td></td>
</tr>
<tr>
<td>______ nm to ______ nm</td>
<td>□ Burner selective</td>
<td>□ Fuel selective</td>
<td></td>
</tr>
<tr>
<td>□ Pilot burner selective</td>
<td>□ 1s</td>
<td>□ 2s</td>
<td>□ 3s</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Analog output</th>
<th>Supply voltage</th>
<th>Minimum IP-Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ 0–20 mA</td>
<td>□ 4–20 mA</td>
<td>□ Flame sensor IP</td>
</tr>
<tr>
<td>□ Control unit IP</td>
<td>□ Compact flame monitor IP</td>
<td></td>
</tr>
</tbody>
</table>

### Ex-Protection Flame Sensor/Compact Flame Monitor

<table>
<thead>
<tr>
<th>ATEX</th>
<th>NEC 500</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zone</td>
<td>Class</td>
</tr>
<tr>
<td>□ II</td>
<td>Division</td>
</tr>
<tr>
<td>Ex</td>
<td>Group</td>
</tr>
<tr>
<td>□ Ex</td>
<td>T</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ex-Protection Control Unit</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Viewing window</th>
<th>ATEX</th>
<th>NEC 500</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ Yes</td>
<td>Zone</td>
<td>Class</td>
</tr>
<tr>
<td>□ No</td>
<td>□ II</td>
<td>□ Division</td>
</tr>
</tbody>
</table>

### Installation Details

<table>
<thead>
<tr>
<th>Elect. connection</th>
<th>Length of cable: flame sensor &lt;-&gt; control unit/compact flame monitor</th>
<th>Sighting tube connection</th>
<th>Position/line of sight to flame</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ Cable gland</td>
<td>□ Plug</td>
<td>□ 6</td>
<td>□ NPT</td>
</tr>
<tr>
<td>□ Cable gland</td>
<td>□ Plug</td>
<td>□ 19”-rack frame for front panel mounting</td>
<td>□ 19”-rack frame for rear panel mounting</td>
</tr>
</tbody>
</table>

### Additional Information

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