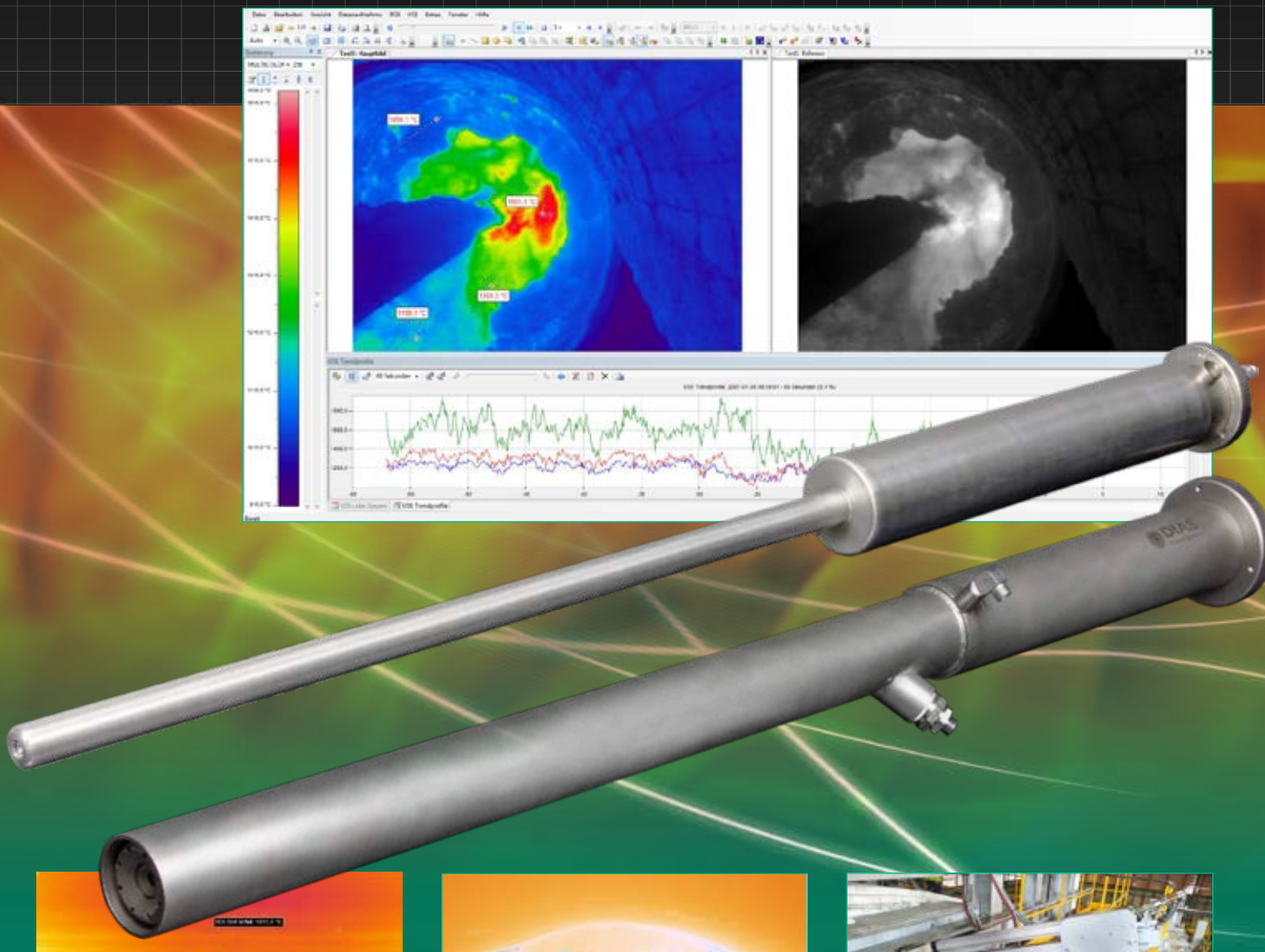
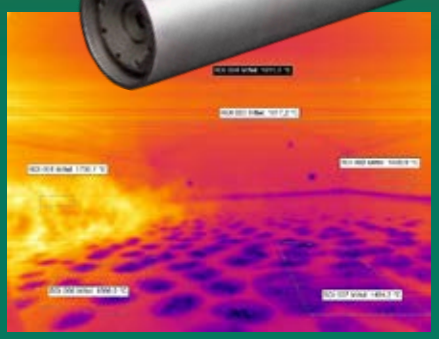
DIAS Infrared Systems

PYROINC endoscope

High-resolution IR camera for combustion chambers with endoscope lens for temperature measurements from

400 °C to 1800 °C





PYROINC endoscope

Infrared cameras for the use in combustions chambers under high temperatures

Image source: Shutterstock.de/zhengzaishuru

Description and application

The PYROINC endoscope is a special and very robust thermal imager series for combustion chambers that measures temperatures in real-time between 800 °C and 1800 °C. A sapphire window protects the motor focus borescope lens. The slim and robust stainless steel probe-cooling jacket can be cooled additionally with air or water.

By using an opening in the combustion chamber walls the probe lens can be inserted. Together with the automatic retraction system it is guaranteed that the system withstands the high temperatures and special requirements of the location. The front part of the probe cooling jacket is able to resist temperatures about 1800 °C with a service life between 2 and 10 years (depending on the operating conditions).

The in-camera web server allows remote access at any time. In this way, remote maintenance can be carried out or thermography data and current operating status can be called up.

In the NIR spectral range, the camera variants PYROINC 320N and 768N endoscope measure temperatures between 400 °C and 1200 °C and 800 °C and 1800 °C respectively. A particularly small diameter of the endoscope optics of only 36 mm distinguishes these camera variants. If there are already existing openings in combustion chamber walls for visual cameras, the IR cameras can be easily inserted and the systems exchanged. For particularly high-resolution temperature measurements the infrared cameras PYROINC 1920N and 1600N endoscope are available. In HD resolution the cameras measure between 1100 °C and 1800 °C in the spectral range 0.8 µm to 1.1 µm (NIR). With the PYROINC 320F and 640F endoscope, temperatures in the range 800 °C to 1600 °C are measured continuously. These temperatures play an important role in rotary kilns in cement production, for example. The cameras are sensitive in the spectral range around 3.9 µm.

Application examples:

✓ In glass melting furnaces the PYROINC 768N endoscope camera for combustion chambers is used for the temperature measurement of the glass melt and for the monitoring of the brickwork.

✓ In cement rotary kilns the ir camera PYROINC endoscope is used for the online temperature monitoring in the sintering area to derive control variables for the burner control.

✓ The PYROINC 320F/640F endoscope camera monitors recovery boiler in paper and chemical pulp factories.

PYROINC endoscope

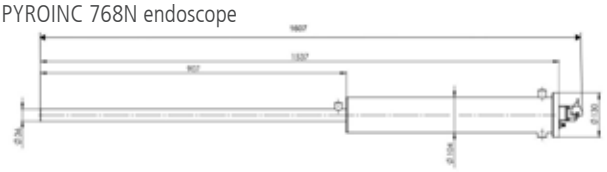
Infrared cameras for the use in combustions chambers under high temperatures

Technical data		768N endoscope	320N endoscope	320F/640F endoscope	1920N/1600N endoscope
Spectral range		0.8 µm to 1.1 µm	1.4 µm to 1.6 µm	around 3.9 µm	0.8 µm to 1.1 µm
Meas. temperature range[1]		800 °C to 1800 °C	400 °C to 1200 °C	800 °C to 1600 °C	1100 °C to 1800 °C
Sensor		uncooled 2D-Si-CMOS array (768 × 576 pixels)	high-dynamic 2D-InGaAs array (320 × 256 pixels)	microbolometer-2D array (320 × 240 pixels/ 640 × 480 pixels)	uncooled 2D-Si-CMOS array (1920 × 1080 pixels/ 1600 × 1200 pixels)
Optics[1]	Field of view	74° × 59°	74° × 59°	75° × 54°	76° × 45°/90° × 72°
	Measurement distance	from 1 m	from 1 m	from 1 m	from 1 m
	Motor focus	yes	yes	yes	no
Measurement uncertainty[2]		2 % of measured value in °C	2 % of measured value in °C	2 % of measured value in °C	2 % of measured value in °C
NETD [3]		1,2 K (800 °C, 50 Hz)[4]	< 1.5 K (600 °C, 50 Hz)[5]	< 1.5 K (1000 °C, 25 Hz)	< 1.2 K (1700 °C, 25 Hz)[6]
Measurement frequency		internal 50 Hz, selectable: 50 Hz, 25 Hz, 12.5 Hz, ...			internal 25 Hz, selectable: 15 Hz, 10 Hz, ...
Response time		internal 40 ms, selectable: 2/measurement frequency			
Interface		Ethernet (real-time, 50 Hz)			Ethernet (real-time, 25 Hz)
Connections		HAN Modular (power suppy, digital inputs and outputs, Ethernet)			
Weight		approx. 15 kg	approx. 15 kg	approx. 10 kg	approx. 15 kg
Power supply		12 V to 36 V DC, typical 7 ... 10 VA			12 V to 24 V DC, 2.8 ... 3 VA
Housing		stainless steel housing, length 1607 mm, ∅ 36 mm, air or water cooling	stainless steel housing, length 1380 mm, ∅ 36 mm, air or water cooling	stainless steel housing, length 1297 mm, ∅ 60.3 mm, air cooling	stainless steel housing, length 1040 mm, ∅ 60.3 mm, water cooling
Operating temperature of camera module		–10 °C to 55 °C (inner device temperature)			
Storage conditions		–20 °C to 70 °C, max. 95 % relative humidity			
Software		PC control and display program PYROSOFT for Windows®, customized version on request			

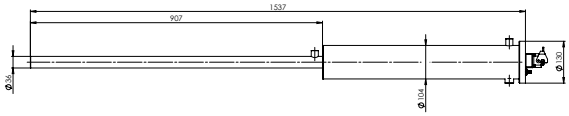
[1] Others on request. [2] Specifications for black body radiators and ambience temperature 25 °C. [3] Noise equivalent temperature difference. [4] ... or 0.15 % of measured value in °C, 50 Hz. [5] ... or 0.25 % of measured value in °C, 50 Hz. [6] ... or < 4 K (1300 °C, 25 Hz).

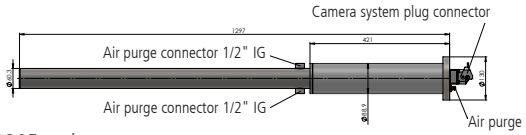
Dimensional drawings PYROINC endoscope

PYROINC 768N endoscope

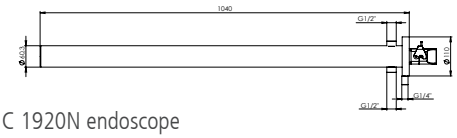


PYROINC 320N endoscope



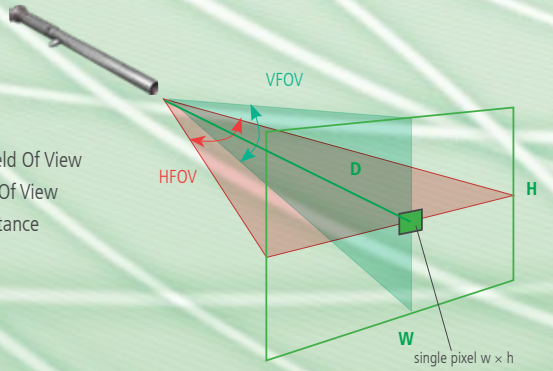


PYROINC 320F endoscope
PYROINC 640F endoscope



PYROINC 1920N endoscope
PYROINC 1600N endoscope

Optics



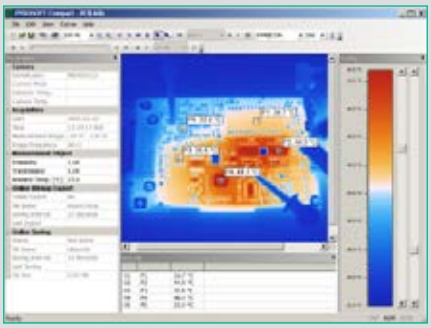
HFOV ... Horizontal Field Of View
VFOV ... Vertical Field Of View
D ... Measurement distance
W ... Image width
H ... Image height
w ... Pixel width
h ... Pixel height

HFOV × VFOV	D [m]	W [m]	H [m]	w [mm]	h [mm]
74° × 59°	1	1.5	1.1	2	2
	10	15	11	20	20
75° × 54°	1	1.5	1.1	5	5
	10	15	11	50	50
76° × 45°	1	1.6	0.9	1	1
	10	16	9	8	8
90° × 72°	1	2	1.5	1	1
	10	20	15	12	12

PYROSOFT

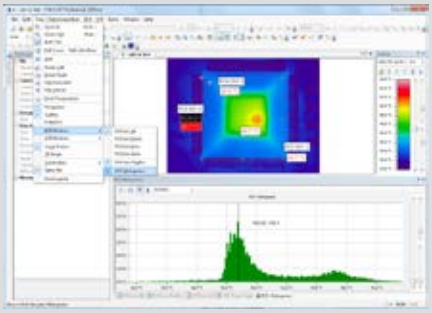
Powerful online and offline software for DIAS infrared cameras

PYROSOFT Compact



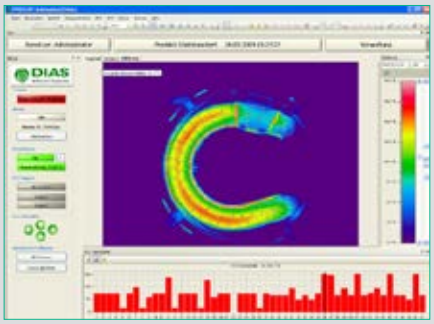
- Online data acquisition of one DIAS infrared camera
- Open and edit archived measured data and sequences
- Bitmap and video export
- Online data storage and online bitmap export
- Definition of regions of interests (ROI): points, lines and rectangle
- Generating of reports in Microsoft® Word format by integrated report function
- Context-sensitive help system (F1 key)
- Included in the scope of delivery of every PYROVIEW infrared camera

PYROSOFT Professional



- Online data acquisition – Analyze, store and export data in real-time
- Open and edit archived measured data and sequences
- Multi document structure for several documents
- Bitmap, video and text export
- Definition of regions of interests (ROI) and values of interests (VOI) with alarm calculation, histogram and trend chart
- Numerous interface possibilities for processes (PROFIBUS, PROFINET, WAGO, TCP-Socket, Text IO)
- Reporting function, context-sensitive help system (F1 key)
- PYROSOFT Professional IO offers optionally a bidirectional data interface via PROFIBUS, PROFINET, WAGO, MODBUS, OPC, TCP Socket to process control systems, controllers and other applications

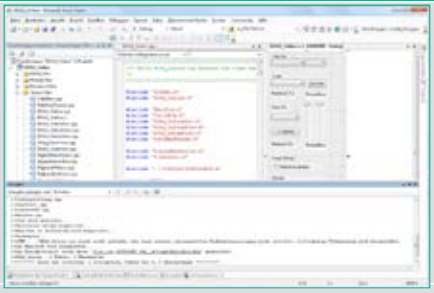
PYROSOFT Automation



DIAS has developed the software PYROSOFT Automation for the integration of infrared cameras in automation processes.

- Comfortable product management with free definable document templates
- Product choice and release control can be made manually or automatically
- Different user levels for operator, tool setter and administrator
- Functionality of PYROSOFT Professional for administrators
- Automatic logging of system messages, measured data and alarms
- Easy to use and configurable user interface for application in fabrication
- Learning functions for automatic adjustment of alarm threshold
- Offline viewer for belated data analysis
- Bidirectional data interface via PROFIBUS, PROFINET, WAGO, MODBUS, OPC, TCP Socket to process control systems, controllers and other applications

PYROSOFT DAQ



For users who want to make an integration into their software environment by themselves, we offer an own online and offline DLL interface for DIAS infrared cameras.

- API (DLL) for direct data access under Windows®
- Support for DIAS IRDX file format
- Setting of data acquisition parameters and object properties
- Query of temperature values and camera information
- Functions for displaying of images and palettes as bitmap
- Online and offline function

More software packages are available, for example:
PYROSOFT MultiCam (process software for monitoring up to 8 cameras), PYROSOFT CamZone (software for programming a stand-alone camera), application specific software like PYROSOFT FDS for DIAS fire detection systems.

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