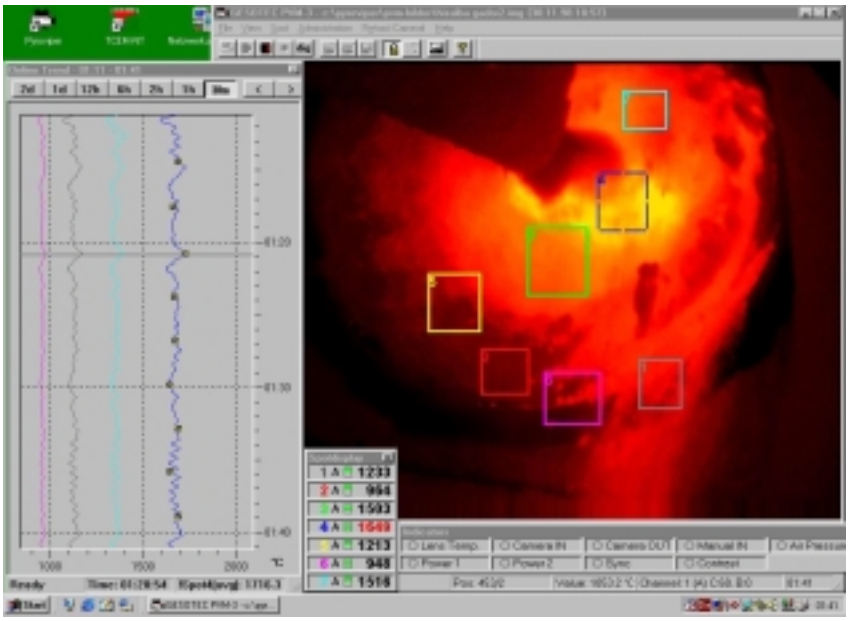
PyroViper™-3 state-of-the-art Pyrometer Imagers

GESOTEC's Pyrometer Imaging system **"PyroViper™-3"** with its different models **"PVM3-xxxx"** combines state-of-the-art digital high temperature video/infrared-imaging with enhanced "two-channel/two-dimensional-pyrometry". This unique combination of two rugged industrial solid-state CCD/Infrared-FPA area sensors has the advantage of no "moving system parts". It gives the operator the ability to observe the process conditions with great visual details while simultaneously measuring accurate temperatures of virtually any object- or region- of interest within the systems field of view (FOV). The **PyroViper™-3** sensor is mounted to the "process wall" together with an air-cooled wall-box. No additional water-cooling is required. A heat resistant housing and an automatic retracting device ensure save operation. **PyroViper™'s** lens- & sensor- assembly is air- purged and cooled by just one air supply line. Its heavy-duty furnace lens is available with usable lengths between 410mm and 1150mm, thus covering most installation conditions.

The visual image- and the temperature- information of the process is captured and transferred through a special patented optical system to the High-Tec Sensor-module of the **PyroViper™-3** system**,** i.e. a two-channel solid-state "Pyrometer-Imager".

The resulting signals are transmitted via coax- or via fiber-optic cable (up to 2km) to **PyroViper™'s** smart **D**ata-**A**cquisition-**C**ontroller **"PDAC-3",** that usually is located in - or near - the process control room.



Both, the video and the temperature information of an object are processed in real time by the **PDAC-3** unit. All Image information and all results are displayed on at least one high-resolution 21" SVGA color monitor. Up to 48 **A**reas-**o**f-**I**nterest of variable size and position (also called "**AOI's**") may be selected by the operator. AOI's can be checked for HI/LO-temperature alarm limits. Max./Min./Avg.-temperature values of AOI's can be linked to separate numerical- and/or trend- display windows. All temperature values and alarm conditions, as well as all other significant status information, can be linked to isolated analog signal 4-20ma output channels and/or to relays.

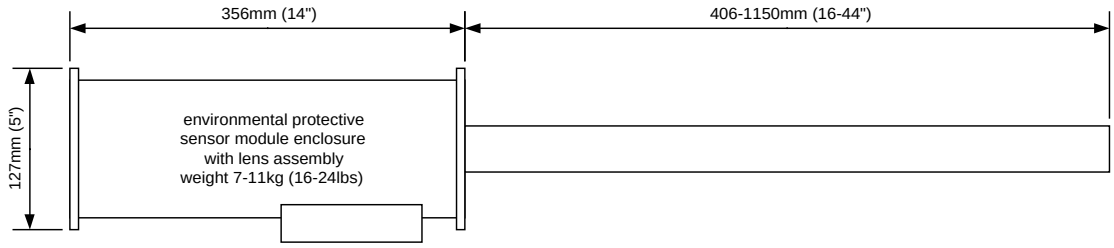
Measurement values are continuously recorded and stored in an easy-to-access-format (ASCII) for further analysis. Difficult process conditions are supported by a variety of special integrated system features, e.g. standard functions for automatic dust detection and for automatic contrast enhancement.

The system features a "Digital-VCR" with image snapshot- and hardcopy functions (file formats: BMP, JPG, Tiff, etc), as well as time controlled automatic -data storage, -image printout, or even -data transfer through Dial-Up-Networking. For a long term trend analysis common spreadsheet programs may be used, e.g. MS-EXCEL™. **PyroViper™** has a build in "Master/Slave-Function" for easy digital online access to **PyroViper™'s** continuously updated video and measurement information through the standard 10/100Mbit TCP/IP Ethernet-Interface via other dedicated LAN-PC Workstations. "LAN-Data-Exchange" with a Win-NT based process control systems is also a build-in feature of **PyroViper™** and can be done in most cases any time onsite without the need for expensive software engineering.

Advantages of PyroViper™-3 against conventional High Temperature CCTV-Systems	Industrial Process
Continuous- & detailed observation of combustion conditions in the burning zone by "Infrared-TV". Accurate measurement of product- and refractory temperature (optional flame temperature).	Cement- & lime- production Waste burning
Monitoring of the clinker- temperature distribution and the clinker- flow along the grates. Reliable "Red-River-Detection". Control of the blower efficiency and clinker bed depth.	Cement clinker coolers
Quantitative Observation & Control of heating uniformity-, product quality, and combustion. Control of Smelt bed size & shape. Improved Boiler Performance, reduced Pollution, optimized fuel consumption.	Reheat furnaces & Boilers

A typical PyroViper™-3 system configuration consists of the following basic components

Air cooled industrial stainless steel sensor housing (extremely heat resistant) with "quick change back plate"
Calibrated high precision solid state smart sensor assembly with an enhanced two-channel "Pyrometer-Imager"
Air cooled stainless steel furnace optics, i.e. rugged lens assembly with patented "Bright Image Optical System"
Heavy duty air purged furnace wall-box, automatic-retract assembly, air filtration system with regulator assembly
Smart data acquisition controller & display unit (S-VGA + S-Video signal output, standard TCP/IP Ethernet-LAN)



PyroViper™-3 sensor assembly for high temperature imaging and measurement

Imaging- and/or measurement- channels:	2 channels: any combination of 2 solid state area sensors adapted to the requirements
Sensor type(s):	Calibrated high performance solid state Silicon-CCD's and/or "Infrared-FPA's"
CCD "imaging resolution", S/N-ratio:	> 450 TV lines horizontal (> 750H x 580V pixels), > 48 dB
CCD/FPA "measurement resolution":	320x240 / 128x128 / 64x64 temperature measurement spots (complete image FOV)
Signal output:	Analog: EIA RS-170 / CCIR / NTSC / PAL
(Depending on the sensor type)	Digital: RS-422 or high speed serial link (8/10/12/14 bit)
Standard temperature ranges:	R1: 425 – 1200°C (797 – 2192°F)
(Customized ranges available on request)	R2: 900 – 1600°C (1652 – 2912°F)
	R3: 1200 – 2000°C (2192 – 3632°F)
	R4: 1800 – 2700°C (3272 – 4892°F)
Spectral sensitivity ranges for single-	High quality industrial Silicon- CCD sensors for standard temperature ranges:
and/or dual- wavelength pyrometry:	- Single mode: 0.75-1.1 or 0.9-1.2µm / dual mode: 0.84-1.2µm and 1.0-1.2µm
(Optical filters adapted to standard-	Optional: Infrared-FPA sensor(s) with special optical filters adapted to the application:
and/or individual- requirements)	- E.g. low temperature mode 1.2-2.7µm/2.2-4.7µm or CO2 mode 4.25µm
Measurement accuracy:	<±1.0% (full scale)
Repeatability:	<±0.5% (full scale)
Temperature resolution:	<5°C (<9°F)
Scanning spot size at 90/50% SRF:	<20/10mrad (>4000/16000 calibrated temperature measurement spots)
Spot measurement cycle:	<1 ms (continuous measurement)

PyroViper™-3 high temperature lens assembly (standard models)

Usable length:	410mm, 550mm, 840mm, 1150 mm (16", 22", 33", 44")
Overall length / Shroud Diameter:	460mm, 610mm, 910mm, 1210 mm (18", 24", 36", 48") / 41 mm (1.625")
Field of view (FOV):	72°H x 54°V x 90°D (other standard FOV's between 36° and 110° are available)
Angle of view (AOV):	Standard AOV is "straight ahead" ("right AOV" and "obtuse AOV" on request)
Environment:	Ambient operating temperature 950°C (1742°F) without additional wall-box cooling
Air purging & cooling requirements:	Instrument-quality air, typical 6 l/sec at 65-100 kPa (10 SCFM at 10-15 PSI)

PyroViper™-3 sensor module enclosure (environmental protective housing)

Material:	STEELON™ (stainless steel over high temperature resistant synthetic)
Environment:	Ambient operating temperature up to 290°C (555°F)
Protection:	IP64 (NEMA 4X)
Air purging/cooling requirements:	Identical air flow as used for the lens assembly (see above)

PyroViper™-3 Data Acquisition Controller "PDAC-3" and Signal I/O-Interface "SIOI-x"

Signal input:	2 channels for imaging- and temperature measurement, 8-32 channels system status
Display signal output (up to 2 monitors):	SVGA 800x600 / 1024x768 / 1280x1024 / 1600x1200 pixels (true color)
Digital PC- and/or LAN- interface:	10/100Mbps Ethernet Link, Standards IEEE 802.3 10Base-T / IEEE 802.3u 100Base-TX
Number of measurement areas:	48 areas of interest of variable position and size ("AOI's")
Digital control signal output:	16 channels (optional up to 48) control- and alarm signals (potential free or dry contact)
Analog control signal output (option):	Up to 48 channels 4-20mA (continuously updated "AOI"-values, adjust. read-out interval)
PDAC-3 Dimensions/Weight/Protection:	19" Rack-mount version, painted steel: 380x240x120mm / 12kg / IP34 (NEMA 12X)
SIOI-x Dimensions/Weight/Protection:	Painted wall-mount steel box: 380x380x210mm / 12kg / IP54 (NEMA 8X),

PyroViper™-3 Accessories and Options

Medium- or heavy- duty air filtration system, Emergency air reservoir, automatic retract assembly, automatic port de-slagger
Heavy duty furnace wall-box with additional lens protection, Options: manual- or auto-shutter, wall-box pan/tilt furnace interface
Industrial **RE**tract- and **S**ensor **C**ontrol **U**nit **"RESCU-3":** automatic retract control, sensor power supply and signal conditioning
Opto-isolated video signal transmission via fiber-optic cable between RESCU-3 and SIOI-x/PDAC-3: up to 2000m/6000 ft distance
Customized optics/optical filters & digital CCD/FPA-sensors with temperature measurement ranges optimal adapted to the application

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