Continuous thermal mapping for process monitoring and plant surveillance
Continuous thermal mapping for process monitoring and plant surveillance

LAND FTi Processing Imaging Systems have been developed using our extensive experience of providing monitoring solutions to industry.

The plant operator has a complete thermal view of the process, with a display that responds immediately to changes. These changes can be used to trigger alarms, automatically control other processes and provide vital quality control data directly to the plant operator.

The FTi can be used in all types of applications, in the harshest plant conditions - operating continuously to provide fast response data. It can directly replace portable solutions which provide only a periodic check, increasing monitoring availability and freeing up plant personnel to act on the data, rather than capture the data.

- Continuous thermal mapping between -20 and 1600 °C / -4 to 2912 °F
- ± 1% Measurement accuracy

Key Benefits of the LAND FTi System

- Unrivalled temperature measurement accuracy and repeatability enable confident small-tolerance process control
- Improving production yield in critical processes
- Monitor heating patterns to determine uniformity
- Provide fast response alarms for process control applications
- Provide detailed thermal profiles for quality control applications
- Minimise slag carry-over in metal production
- Refractory wear - detect hot-spots - make preventive repairs
- Distributed processing architecture facilitates multiple viewing stations throughout the plant.
- Knowledgeable pre-sales and after-sales support from LAND, with over 60 years experience in infrared temperature measurement.
- Strong technical support from LAND - we design and manufacture all major system elements from thermal imaging camera to PC analysis software.

Key Measurement and Analysis Features

- Highest measurement accuracy and repeatability
- On-line thermal analysis system, including points, areas, isotherms, histograms, profiles, alarm generation and export
- Display, control and view measurement information from four thermal cameras simultaneously
- Range of both digital and analog inputs and outputs
- Automatic storage of images in the event of an alarm
- Record and re-play live recorded sequences
- Extensive image processing - full colour display with choice of five palettes, digital zoom, and noise filtering
- Complete parameter control - temperature units, emissivity and background temperature compensation
- Exchange of information via OPC and Ethernet links
- Setting individual point emissivities to improve measurement accuracy
- Delta Temperature function to reference ideal thermal image
What information can be provided to the plant operator

- Live, real-time thermal profile information - for quality control applications
- Timed thermal image acquisition - for periodic monitoring such as process surveillance
- Thermal data to trigger alarm conditions - for process and quality control applications e.g. prevent overheating
- Comparative analysis - record the ideal thermal profile, then continuously monitor to check on deviations in the process
- Temperature measurement - capability for all types of measurement including min., max. and averages
- Record and playback of moving objects - record thermal images of moving processes to pinpoint potential problems

Applications

The applications for an FTi system are wide and varied, and include all thermal process monitoring and plant surveillance applications. Please contact LAND for information on how thermal mapping and profiling can benefit your process.

Using Alarms to trigger key events

A range of alarm conditions and subsequent triggering of events is fully user configurable.

Alarms can be configured/triggered automatically by:

- Exceeding of a simple temperature threshold as a point or specific area
- Digital or analogue inputs which can be used to trigger the saving of images or starting live sequence recording
- Exceeding ambient operating temperatures
- Watchdog - system status

Timed and Continuous acquisition of thermal images on moving processes

The system can be easily configured to capture thermal images at pre-determined intervals. The thermal data is stored for further analysis. This is ideal for repetitive processes or where thermal change is slow and predictable.

Continuous acquisition enables live thermal sequences to be captured and replayed. This can be set manually or triggered via a digital input. The frame rate can be controlled. Where a process is fast moving and potentially undergoes major changes to the thermal profile - this method can help to fine tune a process e.g. heating patterns.

Reference the ideal thermal profile

The Delta Temperature function enables an ideal temperature profile to be used as a reference for all future monitoring. A direct comparison with the ‘best’ image is straightforward. It can be configured to respond to a specific temperature value, a specific point or directly to a reference image.
System Overview

Central Processing System Configuration - with up to 4 remote client connections supported as standard.

- **Air blower unit**
  - Purge air keeps the lens clear in hostile environments

- **Single cable connection**
  - Between the imager and the Interface unit

- **Up to 3 additional multiplexed FTi thermal imager connections supported as standard**

- **Image Processing and Analysis Software (Server)**
  - PC with pre-installed processing, analysis and storage software

- **Remote location**
  - E.g. office or control room

- **ETHERNET Connection**

- **Image Processing and Analysis Software (Client)**
  - PC with pre-installed control, processing and analysis software

- **Remote location**
  - E.g. office or control room

- **NETWORK SWITCH**

- **Voor meer informatie kunt u ons bereiken via:**
  - www.solinas.nl – solinas@solinas.nl – tel +31 (0)297 52 25 52
Distributed Processing System Configuration - with local I/O for Process Control and ability to interact with the system locally or remotely

Controlling the thermal camera
Once the camera is installed and operational, complete remote control is made via the local interface unit (with the optional touch-screen) or a PC located anywhere on plant. Configuration of all camera settings can be made remotely - particularly important where it is mounted in a hazardous location, or where it would be inconvenient to stop the process to allow access.

FTI CP (Server)
Thermal imager power supply and local user interface (optional local touch-screen display shown)

Air blower unit
purge air keeps the lens clear in hostile environments

Max. 20 m / 65 ft distance

Up to 3 additional 'live' FTI CP and FTI thermal imager connections supported as standard

Up to 4 Client connections supported as standard

Process I/O (Analogue/Digital Alarms)

Temporary local Laptop connection for FTI CP configuration

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High resolution thermal imager

High-resolution thermal camera - a permanent, rugged plant sensor

The heart of this system is the FTi thermal Imager. Designed especially to meet the demanding requirements of industrial applications it provides high quality (320 x 240 pixels), live thermal images for the powerful control and analysis software.

The new FTi thermal imager incorporates the latest focal plane array detector technology ingeniously engineered to produce accurate temperature measurement – ruggedly constructed to cope with demanding industrial environments.

Using state-of-the-art digital processing, it provides accurate and highly stable industrial radiometric imaging and temperature measurement from –20 to 1600 °C / -4 to 2912 °F.

Key Features

- Continuous thermal mapping between -20 and 1600 °C / -4 to 2912 °F
- ± 1% Measurement accuracy
- 'Fit-and-forget' type sensor
- High resolution thermal image (320 x 240 pixels)
- Rugged design suited to harsh industrial environments, sealed to IP65 / NEMA 4
- Controlled remotely via touch-screen interface or control room PC
- Straightforward alignment and focusing on the target
- Single cable connection to user interface box
- Simple removal from the mounting plate in seconds
- Optional control module for motorized pan & tilt; air blower for purge
- Connection for air purging and water cooling if the application demands it

Setting new measurement performance standards

The FTi range of process imagers set the highest measurement performance standards for industrial applications.

Contact LAND to discuss your application in detail, and benefit from the best measurement performance.
Control the system locally and remotely

Controlling the system remotely

The remote control option takes full advantage of the flexible server / client architecture of the image processing software to allow full control from a remote PC of all the FTi Imager and FTi-CP functionality, additional input / output capabilities, single image and video file storage and visualization. The connection between the remote computer and the FTi-CP is via an Ethernet cable. It is possible to connect four FTi-CP systems to a single remote PC.

Controlling the system locally

An industrial touch-screen interface can be specified with the FTi-CP to give complete control of the thermal imager setup / configuration and thermal analysis where necessary. For stand-alone process control applications a configuration version of the client software will be available.

Key Features

- Real time local processor - direct, single cable connection to the thermal imager
- Two variants - stand-alone processor or with touch-screen interface
- Rugged design/wall-mounted and suited to harsh industrial environments
- Provides local processed Input/Output signal connections including:
  - Optional digital inputs to start/stop imager recording
  - Optional analogue outputs for re-transmission of temperature values
  - Optional analogue input for background temperature sensor input
  - Optional communication to external blackbody source for on-line calibration configuration
- Provides power supply for the thermal imager
- Ethernet connection to remote image processing display/OPC Client

Specifications

<table>
<thead>
<tr>
<th>Local Interface Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FTI CP:</strong></td>
</tr>
<tr>
<td>Real-time local processor and power supply/signal connection to imager</td>
</tr>
<tr>
<td>Maximum distance to thermal imager: 20 m / 65 ft</td>
</tr>
<tr>
<td>Power Supply: 85 to 264 Vac; &lt; 200W</td>
</tr>
<tr>
<td>Ambient Operating Temperature: 5 to 45 °C / 41 to 113 °F</td>
</tr>
<tr>
<td>Mounting: Wall</td>
</tr>
<tr>
<td>Dimensions (W x H X D): 600 x 380 x 210 mm / 23 x 15 x 8 in</td>
</tr>
<tr>
<td>Weight: 29 kg / 64 lb</td>
</tr>
<tr>
<td>Sealing: IP65 / NEMA4</td>
</tr>
</tbody>
</table>

Options

- Local interface: As FTi CP with touch-screen interface for local configuration of Image Processing parameters (sealing to IP54 / NEMA 3S)

Inputs/Outputs

- **Digital Inputs:**
  - Up to 3 modules from a choice of 5
- **Digital Outputs:**
  - Up to 8 channels through a single module
- **Analogue Inputs:**
  - Up to 8 channels through a single module
- **Analogue Outputs:**
  - 1 channel of current output per module; 4 channels of voltage output per module; up to 2 analogue output modules may be fitted (both modules must be of the same type - either current or voltage)

The user can configure these modules as required by the specific application. They are configured either by the touch-screen interface (optional) or via the remote computer terminal.
For further information please contact the appropriate Land Instruments office, or visit our web site at:  www.landinst.com

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Intelligent Imaging

Features & Benefits

- High resolution radiometric thermal imager, giving detailed temperature information transmitted via a high speed digital connection
- Accurate temperature measurement, enabling optimum process control from over 76,000 individual temperature points
- Simple installation and ease of use, minimises cost and complexity
- Designed for harsh industrial environments, ensuring ultimate measurement reliability and availability

Intelligent Design

The FTI-E Thermal Imaging camera is an integral part of the LAND intelligent imaging solution, and is complemented by an extensive range of dedicated system peripherals.

- LAND Image Processing Software - On-line system providing flexible, application specific thermal analysis
- FTI-E Control Processors - Optional industrial processor providing local process control, configuration and process visualisation
- Industrial Housing - Designed to protect the imager in even the harshest of operating environments and ensures reliable continuous operation

Process Imaging
## Specifications

<table>
<thead>
<tr>
<th>FTI-E 391</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Temperature range:</strong></td>
</tr>
<tr>
<td><strong>Spectral response:</strong></td>
</tr>
<tr>
<td><strong>Frame rate:</strong></td>
</tr>
<tr>
<td><strong>Image pixels:</strong></td>
</tr>
<tr>
<td><strong>Detector type:</strong></td>
</tr>
<tr>
<td><strong>Field of view (4 x 3 format):</strong></td>
</tr>
<tr>
<td><strong>Focusing Range</strong></td>
</tr>
<tr>
<td><strong>System temperature measurement accuracy:</strong></td>
</tr>
<tr>
<td><strong>System temperature measurement drift with ambient temperature:</strong></td>
</tr>
<tr>
<td><strong>System thermal resolution:</strong></td>
</tr>
<tr>
<td><strong>Ambient temperature range:</strong></td>
</tr>
<tr>
<td><strong>Dimensions:</strong></td>
</tr>
<tr>
<td><strong>Weight:</strong></td>
</tr>
<tr>
<td><strong>Sealing:</strong></td>
</tr>
<tr>
<td><strong>Vibration:</strong></td>
</tr>
<tr>
<td><strong>CE Certification:</strong></td>
</tr>
</tbody>
</table>

## Intelligent Imaging

Our Intelligent Imaging solutions aim to solve problems by providing more than just pictures. Each LAND solution offers detailed and accurate temperature information to improve safety and product quality.

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## Specifications

<table>
<thead>
<tr>
<th>FTI-E 490</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Temperature range:</strong></td>
<td>150 to 600 °C / 300 to 1110 °F</td>
</tr>
<tr>
<td><strong>Spectral response:</strong></td>
<td>nominal 5 µm</td>
</tr>
<tr>
<td><strong>Frame rate:</strong></td>
<td>30 frames per second</td>
</tr>
<tr>
<td><strong>Image pixels:</strong></td>
<td>320 x 240</td>
</tr>
<tr>
<td><strong>Detector type:</strong></td>
<td>Uncooled amorphous silicon focal plane array</td>
</tr>
<tr>
<td><strong>Field of view (4 x 3 format):</strong></td>
<td>32 ° / 16 °</td>
</tr>
<tr>
<td><strong>Focusing Range:</strong></td>
<td>0.5 m to infinity / 1 m to infinity / 19 in to infinity / 39 in to infinity</td>
</tr>
<tr>
<td><strong>System temperature measurement accuracy:</strong></td>
<td>±1%</td>
</tr>
<tr>
<td><strong>System temperature measurement drift with ambient temperature:</strong></td>
<td>0.2 ° indicated / 1 ° ambient (°C or °F)</td>
</tr>
<tr>
<td><strong>System thermal resolution:</strong></td>
<td>&lt; 0.2 °C / &lt; 0.36 °F</td>
</tr>
<tr>
<td><strong>Ambient temperature range:</strong></td>
<td>5 to 50 °C / 40 to 120 °F</td>
</tr>
<tr>
<td><strong>Dimensions:</strong></td>
<td>258 x 305 x 330 mm / 10 x 12 x 13 in (fitted inside industrial enclosure)</td>
</tr>
<tr>
<td><strong>Weight:</strong></td>
<td>4.5 Kg / 10 lb / 20 kg / 44 lb fitted inside industrial enclosure</td>
</tr>
<tr>
<td><strong>Sealing:</strong></td>
<td>IP65 / NEMA 4</td>
</tr>
<tr>
<td><strong>Vibration:</strong></td>
<td>0.5 mm, 10 to 60 Hz; 3g, 60 to 300 Hz</td>
</tr>
<tr>
<td><strong>CE Certification:</strong></td>
<td>EN 61326: 1999 B</td>
</tr>
</tbody>
</table>

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The FTI-E Thermal Imaging camera is an integral part of the LAND intelligent imaging solution, and is complemented by an extensive range of dedicated system peripherals.

- **LAND Image Processing Software** - On-line system providing flexible, application specific thermal analysis
- **FTI-E Control Processors** - Optional industrial processor providing local process control, configuration and process visualisation
- **Industrial Housing** - Designed to protect the imager in even the harshest of operating environments and ensures reliable continuous operation
### Specifications

<table>
<thead>
<tr>
<th>FTI-E 800</th>
</tr>
</thead>
</table>
| Temperature range: | -20 to 120 °C / -4 to 250 °F  
| Spectral response: | nominal 8 to 14 µm  
| Frame rate: | 30 frames per second  
| Image pixels: | 320 x 240  
| Detector type: | Uncooled amorphous silicon focal plane array  
| Field of view (4 x 3 format): | 32 °  
| Focusing Range | 0.5 m to infinity  
| System temperature measurement accuracy: | ±1.5°C / < ±3°F  
| System temperature measurement drift with ambient temperature: | 0.2 ° indicated / 1 ° ambient (°C or °F)  
| System thermal resolution: (rms value) | < 0.08 °C  
| Ambient temperature range: (Imager, operating) | 10 to 45 °C  
| Dimensions: | 258 x 305 x 330 mm / 10 x 12 x 13 in (fitted inside industrial enclosure)  
| Weight | 4.5 Kg / 10 lb  
| Sealing: | IP65 / NEMA 4  
| Vibration: | 0.5 mm, 10 to 60 Hz; 3g, 60 to 300 Hz  
| CE Certification: | EN 61326: 1999 B  

### Intelligent Imaging

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FTI-E 801
Thermal Imaging Camera

Intelligent Imaging

Features & Benefits
- High resolution radiometric thermal imager, giving detailed temperature information transmitted via a high speed digital connection
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<thead>
<tr>
<th>FTI-E 801</th>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>Temperature range:</strong></td>
<td>50 to 350 °C / 120 to 660 °F</td>
</tr>
<tr>
<td><strong>Spectral response:</strong></td>
<td>nominal 8 to 14 µm</td>
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* ± 1.5 °C / <±3 °F below 150 °C / 300 °F

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