

# WORKSWELL THERMOINSPECTOR MOBILE



- Complete Thermal Control Package
- Alarm Outputs and Trigger Inputs
- Multiple Camera Connectivity
- Full-screen visualization, graphs and logs
- PLC and Control System Protocols

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# Workswell ThermoInspector Mobile

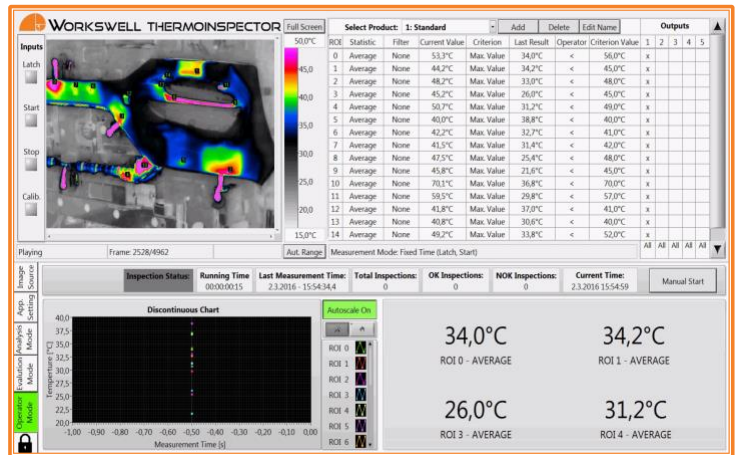
## Introduction

ThermoInspector Mobile is automatic inspection system for thermal monitoring, analysing and evaluation. It can be used for all welding, heating, cooling, soldering and other thermal processes in plastic, metal, biological, chemical and another manufacturing industry. The ThermoInspector Mobile can measure, record and evaluate thermal information in real time and cooperate with existing machine control systems and PLCs.

ThermoInspector Mobile consists a Central Controller unit that supports **up to 4 thermal cameras**. All infrared cameras use highly sensitive infrared sensors (better than 0.03°C) and measure within a temperature range of up to + 1 500 °C (2 732 °F). Due to these extraordinary properties, it can continuously measure and evaluate thermal fields on the measured product surface whether it is plastic, metal or biological material.

The system can consequently check the thermal characteristics such as thermal gradients, maximum or minimum temperature as well as evaluate the dispersion of the temperature along the thermal cut, check the speed of the increasing temperature in the selected area.

Each **ThermoInspector Mobile** package supports multi-camera radiometric streaming, camera control, communication with PLC and various measurement tools. Customers can choose from different types of camera resolutions: 640 x 512px or 336 x 256px and different type of lenses.



## Key Features

- Complete machine infrared vision package
- Resolutions 640 px and 336 px
- Various lenses for each resolution
- Real-time measurement up to 60 Hz
- Plug and Play installation and easy setup with PLC
- Full touchscreen operator visualization and control
- Graphs, tables, OK/NOK indicators and statistics
- 8x digital inputs and outputs, 4x Ethernet ports
- Power over Ethernet cabling and 24VDC supply
- High IP65 camera and transport case protection
- Temperature range up to 1 500 °C (2 732 °F)





# Fast and easy control and installation in production



## Touch the heat...

- Industrial All-in-One Solution
- Front panel IP65 protection
- Fast and easy installation
- VESA interface available
- Full HD touchscreen LCD
- 4 PoE Ethernet ports
- Alarm digital outputs
- Isolated Input triggers
- 24VDC supply input
- 2 more Ethernet for PLC
- Serial communication



ThermoInspector Mobile

## All-in-One package

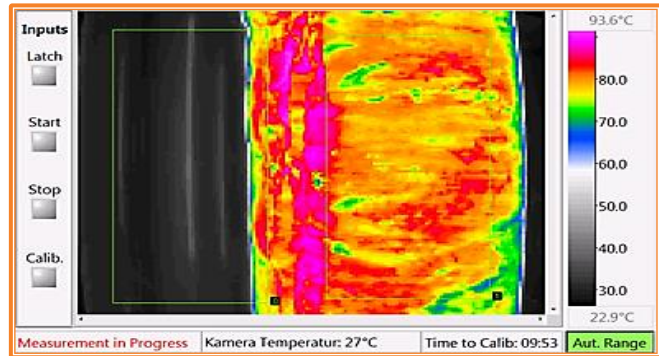
- Hard transport case on wheels
- Easy access to all Ethernet ports
- Touchscreen with IP65 protection
- Admin and user profiles
- Digital IO integrated
- **Simultaneous 4 camera control**
- Various measurement tools
- Automatic product change when digital input received including measurement tools
- **Testing and analyzing mode** for production evaluation
- Direct access to recorded files



# Connect, measure and control the processes

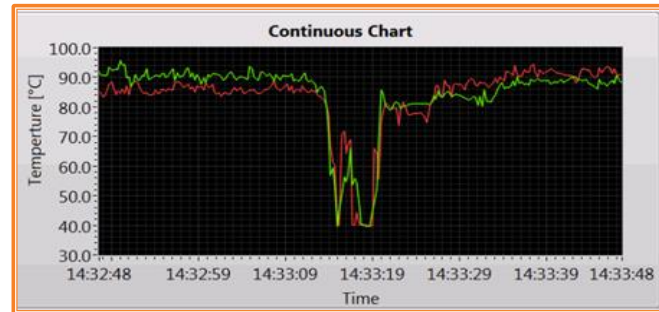
## Real-time Image

ThermoInspector Mobile automatically detects all infrared cameras. Customer can setup different types of color palettes, isotherms, manual temperature span or change camera temperature range. Intuitive graphical interface check user configuration and system integrity. **Operator can place different types of measurement tools** (line, point, rectangular, circle, etc.) and check real-time data streaming and values.



## Graphical evaluation

Workswell ThermoInspector Mobile can display during inspection processes **all necessary data and information that are needed directly on the screen**. From real-time radiometric streaming (up to 4 cameras) including set analysis for each ROI (area of interest) to time charts, temperature profiles and numerical indicators that inform an operator.



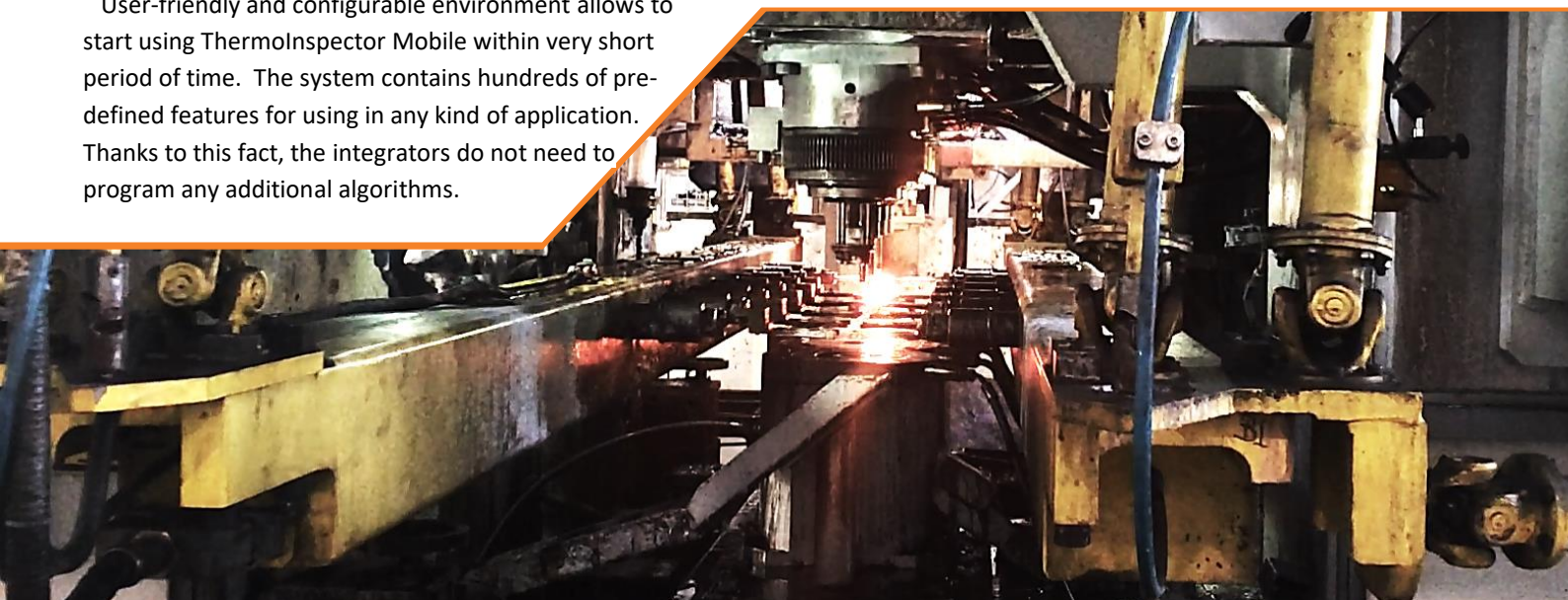
## Alarm and Rule settings

In manufacturing processes, an operator must be able to set different analysis to cover various industrial applications. The ThermoInspector Mobile offers many measurement tools with local setttable emissivity and also, the operator can define statistical markers such as Maximum, Minimum, Average, Deviation and Median etc. When the set condition is broken, the system displays alarm and send digital output to PLC.

Select Product: 1: Standard					Add	Delete	Edit Name	Outputs				
ROI	Statistic	Filter	Current Value	Criterion	Last Result	Operator	Criterion Value	1	2	3	4	5
0	Average	None	40,5°C	Max. Value	53,3°C	<	56,0°C	x				
1	Average	None	32,0°C	Max. Value	44,2°C	<	45,0°C	x				
2	Average	None	41,8°C	Max. Value	48,2°C	<	48,0°C	x				
3	Average	None	31,6°C	Max. Value	45,2°C	<	45,0°C	x				
4	Average	None	44,2°C	Max. Value	50,7°C	<	49,0°C	x				
5	Average	None	33,8°C	Max. Value	40,0°C	<	40,0°C	x				
6	Average	None	33,0°C	Max. Value	42,2°C	<	41,0°C	x				
7	Average	None	41,0°C	Max. Value	41,5°C	<	42,0°C	x				
8	Average	None	32,8°C	Max. Value	47,5°C	<	48,0°C	x				
9	Average	None	35,2°C	Max. Value	45,8°C	<	45,0°C	x				
10	Average	None	32,2°C	Max. Value	70,1°C	<	70,0°C	x				
11	Average	None	35,5°C	Max. Value	59,5°C	<	57,0°C	x				
12	Average	None	24,4°C	Max. Value	41,8°C	<	41,0°C	x				
13	Average	None	23,9°C	Max. Value	40,8°C	<	40,0°C	x				
14	Average	None	32,5°C	Max. Value	49,2°C	<	52,0°C	x				

Measurement Mode: Fixed Time (Latch, Start)

User-friendly and configurable environment allows to start using ThermoInspector Mobile within very short period of time. The system contains hundreds of pre-defined features for using in any kind of application. Thanks to this fact, the integrators do not need to program any additional algorithms.





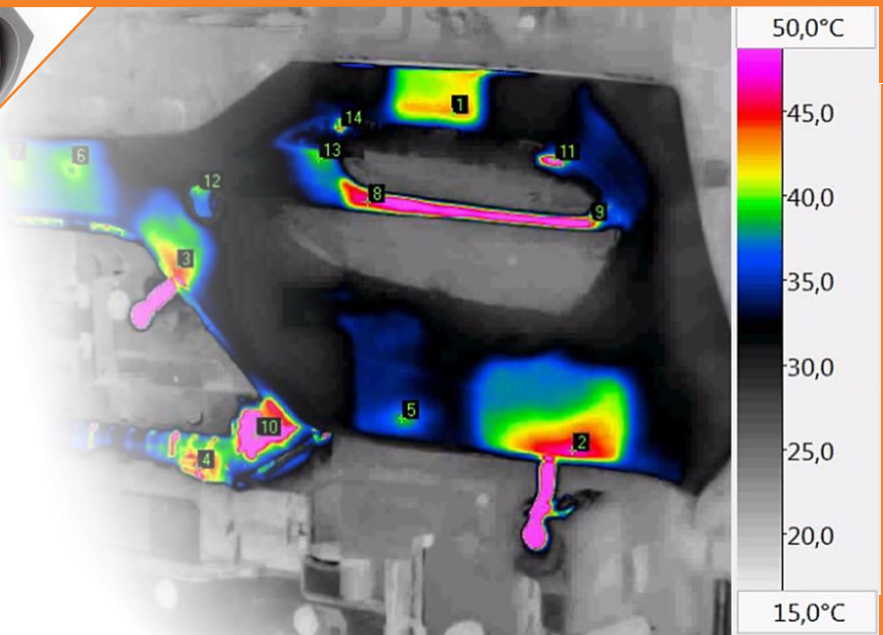
# Many various applications



## Automotive Industry

ThermoInspector helps well-known companies monitor and control quality in serial production:

- Plastic molding injection manufacturing
- Flame jet stability before robotic painting
- Critical temperature during laser welding
- Whole components during final testing
- Cutting and pressure tool overheating
- Material cooling and preheating
- Aluminum induction soldering
- Metal brazing and sintering
- Bonding, gluing or foaming
- and much more...

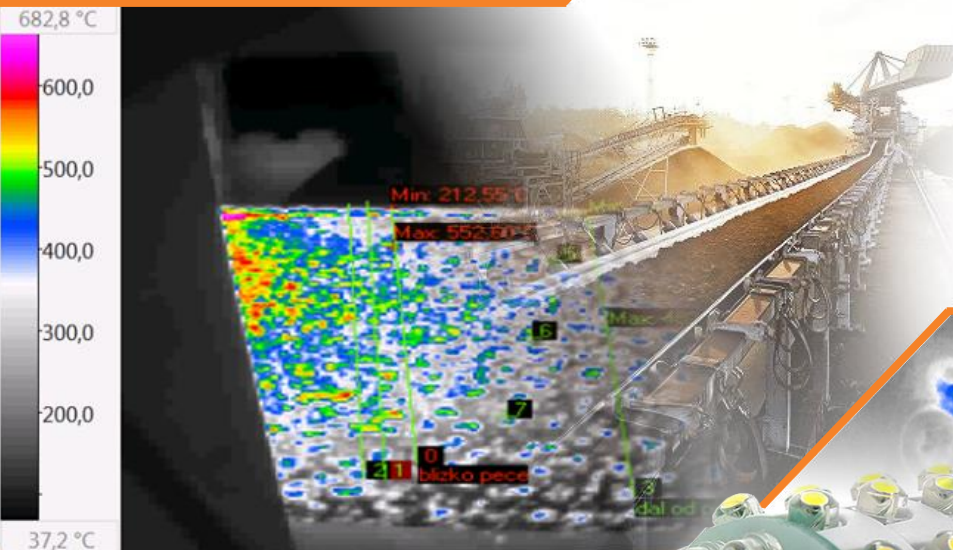


ThermoInspector Mobile

## Safety and Fire Protection

ThermoInspector solution can cover simple one-camera projects as well as comprehensive multi-camera applications:

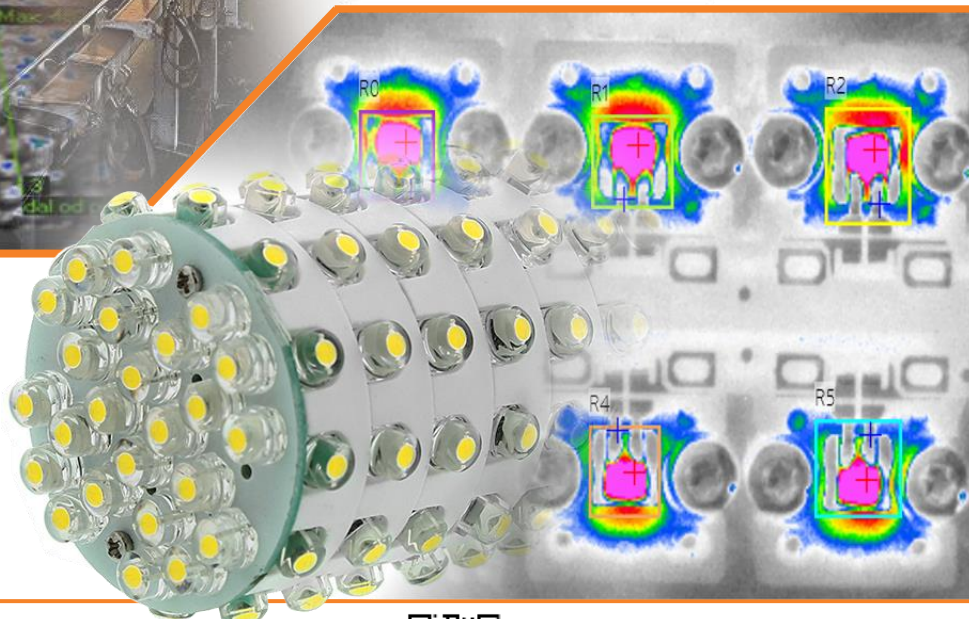
- Tower and warehouse protection
- Material storage system control
  - Waste and coal conveyers
  - Waste and coal bunkers
  - Perimeter monitoring
  - Agricultural landfilling
  - Ladle integrity control
  - Critical slag detection



## Other Industries

ThermoInspector is used in many other industries:

- Food and packaging industry
- Construction and metal industry
- Paper, textile and wood industry
- Chemical, glass and electronic industry



# ThermoInspector Mobile specification

System overview	
Central controller unit	<b>Camera ports:</b> 4 x Gigabit PoE Ethernet, 2 x Gigabit Ethernet for PLC <b>Digital Inputs:</b> 4 x isolated (24 VDC compatible) inputs <b>Digital Outputs:</b> 5 x open collector outputs <b>Power supply:</b> 12-36VDC <b>USB ports:</b> 2 x USB3 super speed ports for data uploading Embedded operating system optimized for multi-camera connection
Central unit Touchscreen	Yes, all settings directly via touchscreen
Thermal cameras	Up to 4 connected <a href="#">WIC cameras</a> per one central unit, 2 different available resolutions: 640 x 512 pixels and 336 x 256 pixels with various field of view.  <b>Lenses:</b> Interchangeable and focusable, various field of view ( <a href="#">FOV calculator</a> ) <b>Framerate</b> up to 60Hz <b>Temperature ranges:</b> -25 °C to +150 °C (-13 °F to 302 °F) -40 °C to +550 °C (-40 °F to 1 022 °F) optional temperature range +400 – 1 500 °C (752 °F to 2 732 °F) <b>Accuracy:</b> ±2% or ±2°C (±3.6 °F) <b>Temperature sensitivity:</b> ≤0.03°C (30mK) @ 30°C
Cables and adapters	Digital input and output cable glands prepared directly in transport case Ethernet cable for every delivered camera Power supply adapter for 230VAC
Content of delivery	<b>Package:</b> Hard transport case, Touchscreen Panel Controller (IR Software included, LCD), Cables (DIO 1m, UTP 10m, DIO board)
Power supply	
Controller Supply Input	12-36 VDC or 230 VAC
Camera Supply Input	Integrated in the control unit, Power over Ethernet supplying
Power Dissipation	150 - 200 W
Mechanical and environmental information	
Touchscreen dimensions	22-inch panel, 538 x 329 x 53 mm (21.2 x 12.9 x 2 in)
Hard transport case dimensions	630 x 490 x 300 mm (24.8 x 19.3 x 11.8 in)
Weight	Approximately 19 kg (41.9 lbs), depends on final system configuration
Operating temperature range	0 – 45 °C (32 °F – 113 °F)
Storage temperature	-30 °C – 60 °C (-22 °F – 140 °F)



# ThermoInspector Mobile Function Specification

## Thermal Camera Settings

<b>Source of image</b>	<b>Fully radiometric streaming and real-time measurement</b> for every connected thermal camera WIC. User can connect different cameras with different resolution and lenses to the same central controller. Cameras can run up to <b>60Hz</b> (depends on resolution and number of cameras connected to the controller), <b>set different temperature ranges and trigger settings</b> . System measures current FPS, camera body temperature and communication stability
<b>Radiometry</b>	Emissivity, windows transmission, Humidity, reflected temperature, atmospheric temperature and distance correction. Image can be rotated every 90 degrees
<b>Calibration</b>	Each camera is supplied with special calibration file saved in ThermoInspector system
<b>Non Uniformity Correction (NUC)</b>	Fully controllable to avoid image interruption during the measurement and control time
<b>Units and zoom</b>	Temperature can be displayed and calculated in <b>°C or °F</b> or in RAW data format. Every single camera can be zoomed in specific way for precise ROI settings pixel by pixel
<b>Palettes and Isotherms</b>	User can choose from <b>14 palettes</b> – BlackRed, BlueRed, BWRGB, Fire, FLIR Iron, Gradient, Gray, Iron1, Natural, Rainbow, Sepia, Steps, Temperature, WBRGB. There are also several types of temperature isotherms (above, bellow, between) available

## Graphical environment and operator vizualization

<b>Measurement tools</b>	ThermoInspector Mobile contains various measurement tools (Point, Rectangular, Ellipse, Line, etc.) with local selectable emissivity. User can define statistical markers such as Maximum, minimum, average, Deviation, Median etc. for each ROI
<b>Administration</b>	User can set administrator password for system locking
<b>Language</b>	English, German, Polish and Czech
<b>Graphs and Values</b>	Continuous or discontinuous time charts, temperature profiles and numerical indicators
<b>Background features</b>	Automatic Start-up System initiation, TCP/IP data sharing, Ethernet IP data protocol
<b>History and logs</b>	ThermoInspector can save criterion tables, measurement results, images and graphs
<b>Full-screen mode</b>	User can switch between standard machine vision (Image, table and graph) visualization to the full screen multi image (Matrix) visualization of all 4 cameras connected

## Measurement and control modes

<b>Triggers and alarms</b>	Independent triggers (camera selectable) – falling, rising edge or latch, Up to 5 alarm outputs
<b>Evaluation modes</b>	There are several types of evaluation modes. The most common applications use one time triggered measurement and afterwards evaluation. ThermoInspector can measure single shot image or sequence. For all 24h/7 applications you can use Non-trigger mode. If you need check temperatures between Start and Stop time, ThermoInspector integrates latch mode.
<b>Product selector</b>	ThermoInspector integrates powerful features that offer possibility to select different ROI (measurement tool) in specific time. It brings flexibility to use only one ThermoInspector system for various products on single machine. ThermoInspector receives the trigger from PLC and changes automatically the ROI positions according to pre-defined settings.



# Contact information

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