

Complex Monitoring System for NPP Critical Infrastructure



T-COMPLEX

PROTECTION AGAINST CRITICAL BREAKDOWN AND DAMAGE

T-complex system is designed to monitor specific industrial buildings, parts of critical infrastructure and technological processes, where is an increased risk of critical situations due to a breakdown of technical equipment. Maximum system functionality is achieved through a unique combination of professional detection systems, thanks to which, it turns into a complex monitoring system suitable for sophisticated industrial applications.

Comprehensive Integration

- Thermographic cameras for continuous temperature monitoring of objects, automatic detection of overheating or fire, post-analysis of temperature changes
- Sensors for continuous monitoring of selected process parameters and physical quantities, automatic detection of exceeding preset levels, post-analysis of data changes
- CCTV cameras for 24/7 video surveillance monitoring, advanced video analytics, post event analysis
- Additional monitoring and safety modules

Easy To Use For Efficient Working

- Virtual cockpit interface with 3D look
- Full touch-compatibility with intuitive operation
- Optimized ergonomics
- Clear user interface via a fixed layout of the elements
- PTZ control element with advanced functions
- Completely new video player with shuttle wheel

Redundancy Concept

- Guarantee of image recording if a recording server fails
- System access even if the central administration server fails
- Support for Windows Cluster and virtualization

Advanced applications in Live & Archive mode

- Parallel Live and Archive views possible (mixed operation)
- Alarm-related information at a glance with multi-way view (Pre-Alarm / Live /Archive/Trigger)
- Camera selection via lasso in layout plan for rapid evaluation of the situation

Practical System Administration

- Multi-level administration – compatible with any organizational structure
- Multi camera configuration for rapid setup and modification of camera functions



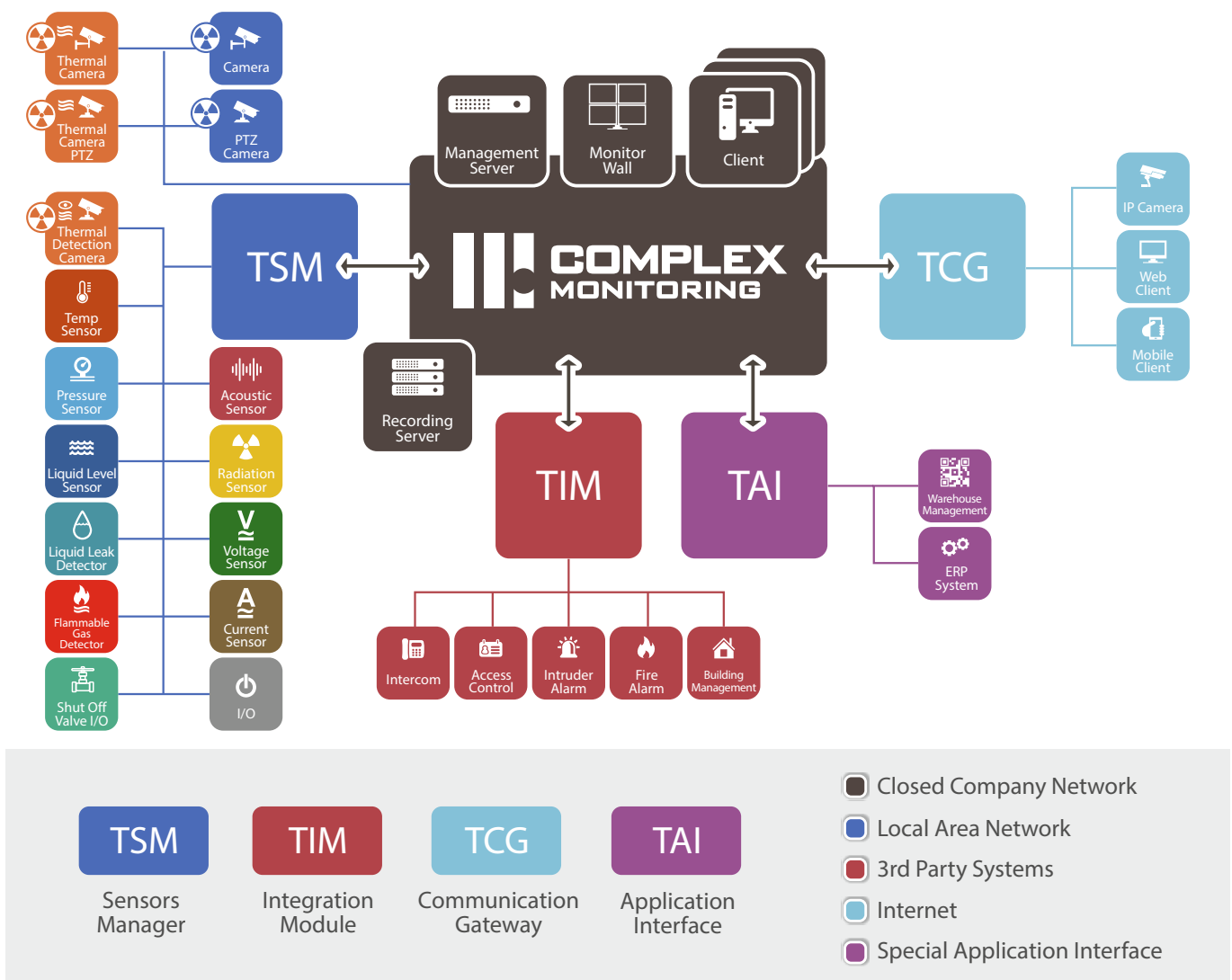
T-COMPLEX

„ALL IN ONE“ SOLUTION

MULTIFUNCTIONAL PLATFORM, MODULAR CONCEPTION

Thanks to the modular multifunctional platform the T-complex system can be used for the implementation of sector-specific and security-specific solutions of any size and complexity. The system offers unlimited network options in combination with simple, flexible administration and intuitive way of use.

If required, a variety of functions can be added to the core software platform via interfaces, metadata, protocols, expansion modules and sector-specific solutions.



Features

Management

- Cameras and sensors
- Warnings and alarm notifications
- Video and data recording
- User authentication

Visualisation & information

- Visualisation of temperature changes in infrared spectrum (live)
- Real-time monitoring of selected parameters
- Live view and visual inspection

Real-time analysis & detection

- Fire detection
- Overheating detection
- Detection of over limit parameters
- Motion detection
- Other detection modules

Retrospective analysis

- Review of alarm events
- Playback of infrared recordings
- Playback of video recordings
- Analysis of parameter values and its change in time

SENSORS MANAGER

REAL-TIME MONITORING DETECTION & RETROSPECTIVE ANALYSIS

T-Sensors Manager is special software module which as a part of the T-complex is used for continuous monitoring and detecting changes of selected technical parameters and physical quantities in real time. T-Sensors is able to detect changes of monitored parameters and effectively notice device operator if any parameter exceeds safe value. With this future is operator able to effectively avert impending danger and eliminate potential economic damage.

As part of the T-complex it is possible to use the interconnection of detection, visualization and comprehensive alarm management.

System Description

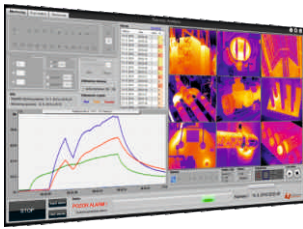
T-Sensors Manager consists of two main subsystems - The Active Sensors which continuously monitor selected objects and The Central System that continuously collects and evaluates metadata from all sensors in real time. If it is necessary, for example at exceeding of defined limits, system can trigger its built-in alarm function.

Function	Measurement	Data Recording	Value Displaying	Detection	Post-Analysis
Thermographic camera	✓	✓	✓	✓	✓
Temperature sensor	✓	✓	✓	✓	✓
Non-contact temper. sensor	✓	✓	✓	✓	✓
Radiation level sensor	✓	✓	✓	✓	✓
Pressure sensor	✓	✓	✓	✓	✓
Liquid leak detector	✗	✗	✓	✓	✗
Sound detector	✗	✓	✓	✓	✗
Humidity sensor	✓	✓	✓	✓	✓
Voltage sensor	✓	✓	✓	✓	✓
Current sensor	✓	✓	✓	✓	✓
I/O contact	✗	✗	✓	✓	✗

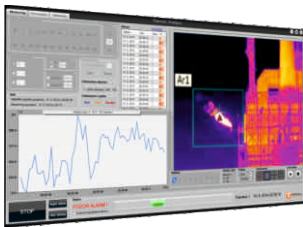
Other sensors available on request



System operates in these four basic modes



In active surveillance mode, observed object is constantly monitored by thermographic cameras and various sensors. They provide all necessary data to evaluate the situation for central system. In case that the system detects undesirable changes of monitored parameters (acceleration or exceeding of defined limits), can immediately trigger an alert and also notify the device operator. The monitoring mode is fully automatic and requires no operator presence.



During the monitoring mode system displays live video streams from connected thermographic or CCTV cameras on monitor screen. The system also displays numeric values of actual temperature and other monitored parameters from connected sensors. If necessary, it is possible to display actual output value from selected sensors on monitor screen in a form of "a floating curve" in the time chart. Actual status of all active detection cameras and sensors is continuously displayed on the central monitor screen. All captured parameters from thermographic cameras

and sensors are in the form of data continuously recorded and archived by central data storage system. T-Sensors Manager system is also able to perform a post-analysis of selected events from archived data.

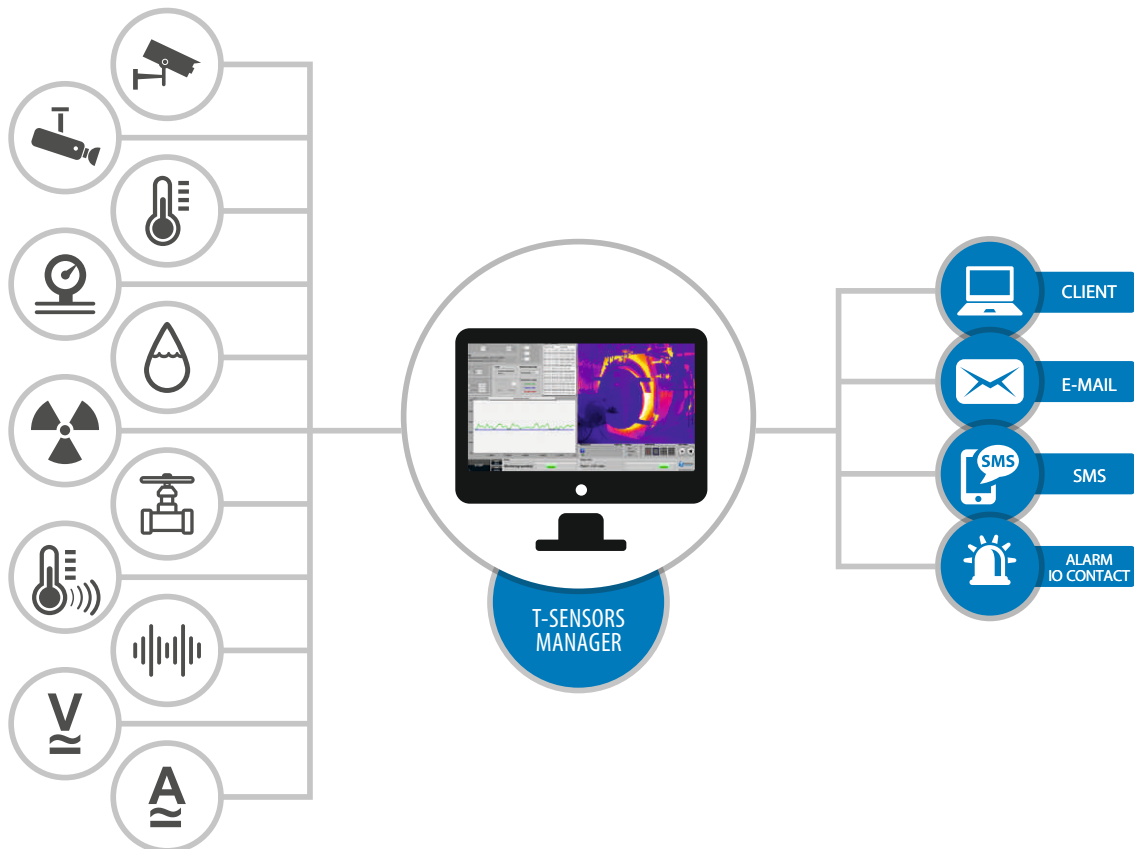
The analysis can be done in two different ways:

- ☒ Visually - by playing a video from thermographic and visual CCTV cameras
- ☒ Graphically - by displaying parameters changes from selected sensor in time

Post-analysis of video recordings or selected parameters allow operator to determine an exact start and very often also a probable cause of an event that has occurred.

Predicting system - to avert imminent danger even before it arise.

One of the major advantages of T-Sensors Manager is its ability to anticipate the impending danger. Intelligent software can recognize a dangerous situation at the stage of the beginning when monitored parameters begin to pass from stable to unstable state. It is usually much more before the dangerous situation will really happen. In this case the system will announce so called "technical alarm" and it enables operator to take preventive measures to divert imminent danger in advance.



SENSORS MANAGER

COMPREHENSIVE SUPPORT OF CAMERAS AND DETECTORS



Standard CCTV Cameras

Visible cameras provide continuous surveillance of critical areas

- Digital or Analog
- Fixed or PTZ
- Wide range of supported IP cameras and encoders



Thermographic Cameras

Provide infrared video and complex temperature data of observed object

- Thermographic Cameras for contactless measurement of temperature
- Temperature measuring range -20°C ... 1200°C
- Fire and over temperature detection
- Continual thermographic stream with temperature data
- Wide range of various lenses
- Internal and external using (IP66)
- Version for explosive (Ex) environment available



Temperature Sensors

Temperature sensors for a local temperature measurement and overheating detection

- Measuring range from -55 °C ... +400 °C
- Over temperature detection
- Metal housing with IP68 protection
- Various design optimized for each installation condition
- Version for explosive (Ex) environment available



Non-contact Temperature Sensor

Temperature sensors for a local temperature measurement and overheating detection

- Measuring range from 0 °C ... +2 200 °C
- Over temperature detection
- Emissivity correction
- Metal housing with IP68 protection
- Various design optimized for each installation condition



Radiation Level Sensors

Used as photon dose rate probe in radiation protection

- Dose Rate Range 0.1 μSv/ – 1 000 mSv/h
- Energy Range 10 meV to 20 MeV
- Temperature range -5 °C to 50 °C
- Stainless steel housing with IP65 protection



Pressure Sensors

Pressure sensors for a local pressure measurement and overpressure detection

- Measuring range 1 ... 600 bar (15 ... 10 000 psi)
- Overpressure detection
- Metal housing with IP68 protection
- Various design optimized for each installation condition
- Version for explosive (Ex) environment available



Shut Off Valve Contacts

Check the actual status of Shut Off Valve

- Provides logical information about the current status of the Shut Off Valve
- Version for explosive (Ex) environment available



Acoustic Detectors

Acoustic detectors are capable to detect of gas leaks from defect spots of pipes, armatures or tanks

- Recognizes actual acoustic gas leak "signature"
- Wide acoustic dynamic range
- Explosion-proof stainless steel housing
- Extended frequency range of detection (sound and ultrasonic)
- Provides highest level of false alarm elimination



Liquid Leak Detectors

Detection of leaked liquid in escape sump

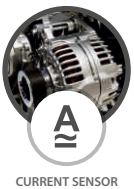
- Various types of leak detectors:
 - floating switch
 - capacitive cable
 - resistance detector
- Version for explosive (Ex) environment available



Voltage Sensors

Measurement and detection of voltage fluctuations in the power cables

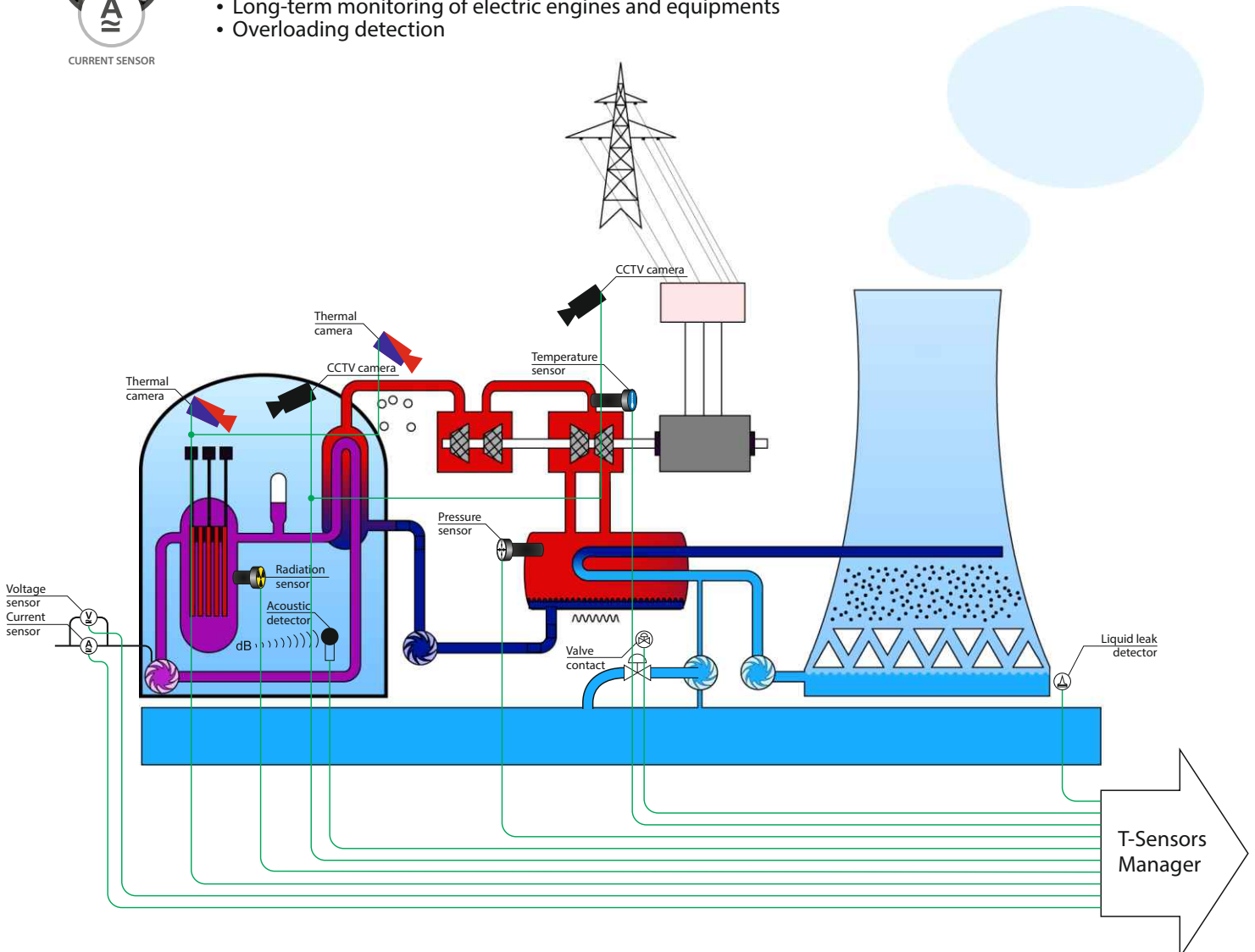
- Long-term monitoring of electric engines and equipments
- Overvoltage detection



Current Sensors

Measurement and detection of current fluctuations in the power cables

- Long-term monitoring of electric engines and equipments
- Overloading detection



T-COMPLEX

THE HEART OF THE MULTI SOLUTION PLATFORM, UP FOR EVERY CHALLENGE

T-Complex is at the core of the Multi Solution Platform. With this modular system concept, T-Complex offers a range of application options extending far beyond the traditional security sector. Thanks to a variety of many different modules and interfaces that can be docked onto the T-Complex core software, individual, scalable video management solutions are produced for every conceivable application and purpose – solutions that are as unique as a fingerprint.

Sector Specific Applications

The extension with our Business Suites means that T-Complex is also able to support and optimize business processes in the various segments of industry, stock-keeping, material and products manipulation, energy distribution and power plants. To achieve this, video data are linked to process and business related company data to generate new sector and customer specific insights. The Business Suites include a range of different interfaces, such as to PoS, RFID or warehousing systems, as well as analysis tools such as object and people counting.

Image Analysis Modules

T-Complex has powerful modules for evaluating video data from different sources, including video analysis, license plate detection as well as object and people counting. These modules provide targeted support for the user in recognizing relevant events.

Interfaces for System Integration

T-Complex can be optimally integrated into the architecture of your security system. Third party systems such as PSIM systems (Physical Security Information Management), alarm centers and access control solutions can be linked up and controlled via a variety of interfaces.

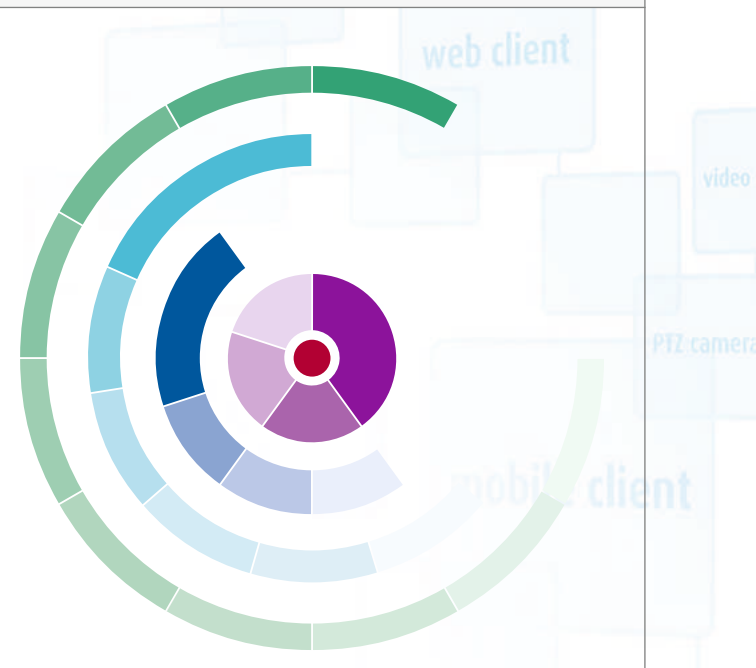
Varied Access Routes

T-Complex can be accessed securely from anywhere – including via web & mobile clients. The Display Agent allows image data to be visualized on large screen systems.

The Multi Solution Platform

Individual software solutions following a modular design pattern

The Multi Solution Platform can be extended as required and scaled without limit, thus offering maximum investment protection. This means it provides cost-effective solutions for the long term, too.



- T-COMPLEX SYSTEM
- DETECTION
- ANALYTICS
- INTERFACES
- ACCESS OPTIONS

T-COMPLEX

LIMITLESS NETWORKING FOR THE PERFECT INTERACTION OF ALL COMPONENTS.

Made-to-measure solutions can be implemented with the greatest possible level of networking. The high degree of openness and interoperability of T-Complex permits existing and new systems to be linked in individually. T-Complex can meet every possible requirement here. A variety of hardware and software components can be integrated via interfaces and protocols – this also makes T-Complex ideal as a solution for large and complex projects.

The outlay is low for new installations because T-Complex can be quickly and easily integrated into your existing system environment. Connectivity also means that old systems can be retained and can continue to be used. All this ensures that T-Complex delivers cost-effective and sustainable solutions.

Hardware Integration

- T-Complex is not manufacturer-dependent, meaning it supports a wide variety of camera models from many different manufacturers.
- Many additional camera models can also be integrated via the ONVIF standard.
- Analog cameras and systems are integrated via video encoders.
- Analog system components are connected via I/O modules.

System Integration

- Sector-specific solutions such as PoS and ERP systems are integrated quickly and easily via Business Application Interface (driver-based concept).
- Security systems such as building management and PSIM systems, access control systems, intruder and fire alarm systems as well as alarm centers and control room solutions are integrated via interfaces.
- Other third party systems can be integrated via network I/Os and TCP triggers.
- VoIP-compatible devices are linked up via the integration of SIP servers.



Stainless steel PTZ camera



Radiation tolerant PTZ camera



High radiation resistant CCTV camera

T-COMPLEX

INTELLIGENT VIDEO ANALYSIS MAKE THE RIGHT DECISIONS

The highly specialized evaluation and analysis tools in T-Complex qualify the image data received and filter out all relevant information – either directly or in combination with existing business data. A custom compiled set of analysis tools is used to issue specific information that is important to you. Targeted analysis routines allow you to record and evaluate results more quickly – and make the right decisions as a result.

Comprehensive Video Analysis

Video analysis uses individually defined rules to automatically direct your attention to risks and hazards, achieving targeted alarm handling. The analysis algorithms are configured directly in the user interface. T-Complex video analysis can differentiate reliably between different object types (persons, vehicles, etc.). There are numerous detection rules available, based on virtual tripwires or detection areas in the camera image.

Fields of application: Perimeter security, monitoring of safety-critical areas such as stations, airports, power stations and companies, theft protection in wholesale and retail, and much more.

Additional Analysis Modules

License Plate Recognition

The LPR module (License Plate Recognition) can automatically read license plate formats from numerous countries, including even formats with Cyrillic and Arabic fonts. It can cover multiple road lanes simultaneously.

Fields of application: Traffic monitoring, vehicle access control, barrier control, allocation of parking spaces and much more. The license plate detection function is also ideal for marketing purposes, e.g. to determine the geographic origin of customers.

Counting

The Counting module counts persons and objects that have passed defined points.

Fields of application: For the management of flows of people in the transport and traffic sectors, and at large events, for example. The Counting function can also be used in retail to analyze customer flows, e.g. as the basis for optimizing product placement in stores.

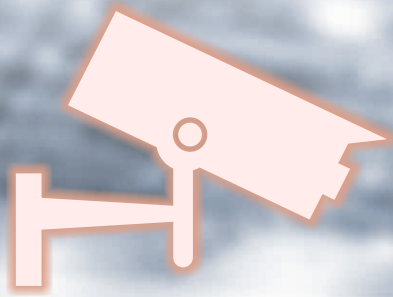
Analytics Interface

The range of functions in T-Complex also allows you to use the Analytics Interface to integrate camera and server-based analysis functions from other manufacturers. This means: With T-Complex you can utilize all the latest analysis functions for your company – for optimum video management.

Other Analysis Functions

- Server-based motion detection – can be quickly and easily activated via the “record on motion” function
- Support for camera-based motion detection
- ISearch: Ex-post search function in archive image material for faster tracking of events

Function	
Area of Interest	optional
Object Classification	optional
Tripwire (also non-linear)	optional
Multi-Line Tripwire	optional
Area of Interest “Inside”	optional
“Entering”	optional
“Leaving”	optional
“Appearing”	optional
“Disappearing”	optional
Loiterers	optional
Left Objects	optional
Removed Objects	optional



Comprehensive Video Analysis Functions



ISEARCH

Intelligent archive research: By masking an object in the camera view you are able to understand within seconds what happened to it.



TRIPWIRE

To protect high security areas, virtual tripwires can be defined that cause an alarm in case of trespassing.



COUNTING

Object and people counting generates a continuous flow of information to support decisions.



LPR

License plates are read out with complex algorithms. The acquired data can be automatically provided for further applications.

T-COMPLEX

INTUITIVE OPERATION

FOCUS ON WHAT'S REALLY IMPORTANT

T-Complex combines maximum functionality and maximum user-friendliness. The user interface impresses with an exceptionally clear layout, offers intuitive user guidance and is fully touch-compatible. Thermal Security exploits the benefits of modern operating concepts and combines them with ingenious functionality and optimum ergonomics – right down to a glare-free night mode.

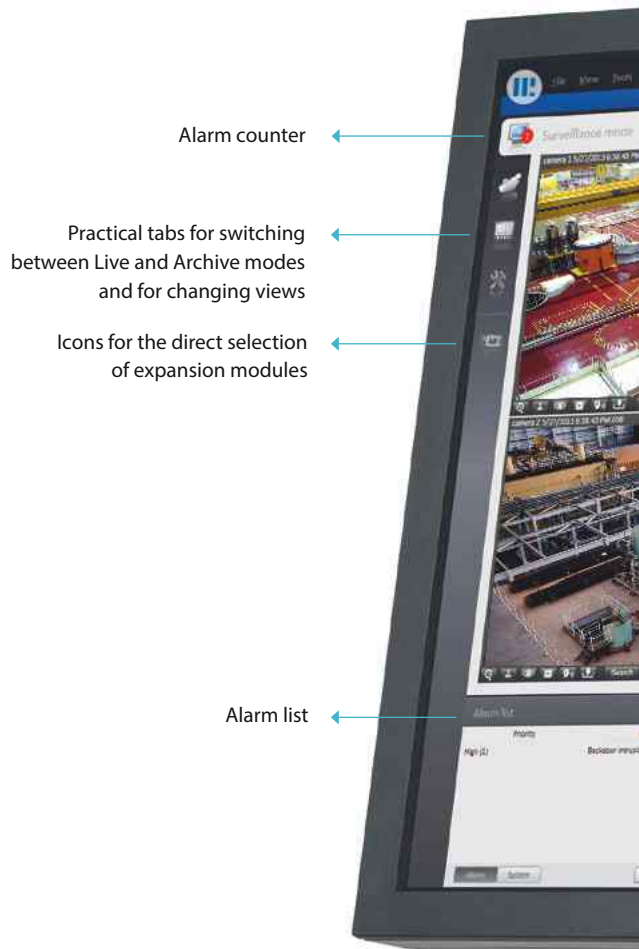
This gives you a clear overview at all times so that you can respond quickly – in Live, Archive and Configuration mode. Thermal Security is easy, fast and effective in operation, even with just a short familiarization phase – an advantage that becomes all the more important for company installations, the more complex they are and the more facets they include.

Time-Saving Functionalities

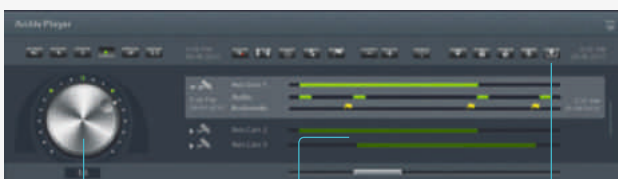
- Multi camera configuration for rapid setup and modification of camera functions
- Camera selection via lasso directly in the layout plan – for rapid interpretation of situations
- Positioning views by “lassoing” onto video walls

Efficient Alarm Management

- Alarm counter and toast messages – this gives you all the current alarms “on one screen” in Archive mode
- Color definition – classifies alarms for improved clarity of layout
- Four-way display with Pre-Alarm/Live/Archive/Trigger view – for improved understanding of events



Completely New Player



Shuttle wheel

Bookmarking and export with selection pins

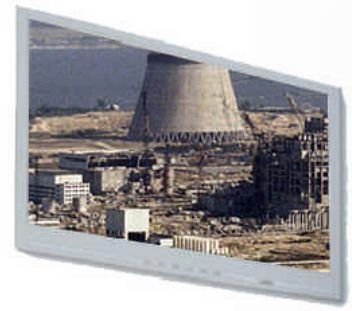
Export overview

- Shuttle wheel for rapid navigation in Archive mode
- Bookmarking makes it easier to find events in the archive
- Easy export of sequences in one step via selection pins (export procedures in the background are displayed via counters and progress bars)



T-COMPLEX

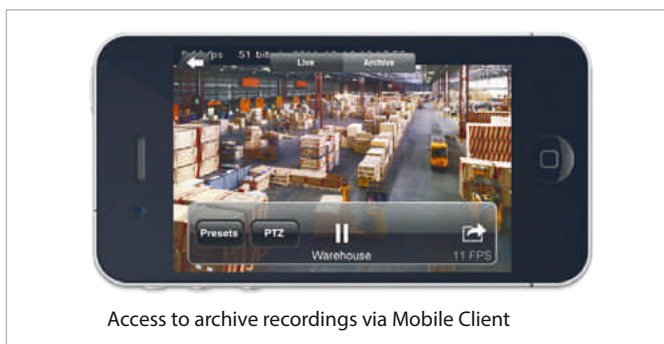
FLEXIBLE ACCESS OPTIONS TO HAVE EVERYTHING UNDER CONTROL AT ALL TIMES



In a mobile world with global business relationships, video management is required to work properly regardless of location. T-Complex offers practical and time-critical access options and transmission solutions that allow you to keep your eye on your company from anywhere in the world. Naturally your data is secure at all times.

Web & Mobile Clients

For rapid and flexible system access. No additional video plugins are required as all image streams are converted to a standardized format via the Transcoding Gateway. Web & Mobile Clients are available for various mobile devices such as tablets and smartphones (iOS and Android).



Access to archive recordings via Mobile Client

Display Agent/Virtual Matrix

Integration of large screen systems and video walls from different manufacturers; the video walls can be controlled via a standard client.

Multi-Installation Login

Allows a user (e.g. in an alarm center) to connect to multiple installations simultaneously and to access all connected cameras.

T-Complex Anywhere

Allows you to run T-Complex on any computer with no prior software installation required. Depending on user rights, T-Complex Anywhere offers all the functions of the installed version, such as live and archive view, administration and system configuration.

Data Security

In two different ways: selected screen areas are hidden via masking; moving objects are pixelated and thus anonymized via scrambling. System access can also be secured via the four-eye principle (input of a second password).

Transcoding

For optimal image transmission: by transcoding video streams, images can be bandwidth optimized by the server for transmission to the terminal. For example, images are recorded in full HD and streamed to iPad via 3G in low resolution.

Multi Streaming

T-Complex can transmit, save and display multiple camera streams with different parameters for different applications.

Encryption

Data transmission between modules as well as between server and client is carried out using encryption based on an AES-encrypted communication connection.



CENTRAL MONITORING SYSTEM

A diagram illustrating the use of mobile surveillance equipment. On the left, a camera is mounted on a tripod and connected to a central monitoring system. On the right, two workers in blue silhouettes are performing maintenance on a large cylindrical industrial component. One worker is using a tool that produces a bright orange spark, while the other is holding a large circular flange. The background shows a blurred industrial setting.

MOBILE SURVEILLANCE EQUIPMENT - Using during maintenance and services
One „mobile“ surveillance set can contain: visible camera, thermal camera and selected sensors.

TECHNICAL INFORMATION

LICENSE MODEL AND RANGE OF SERVICES

T-Complex system is available in four different packages: up to 4, up to 16 and for an unlimited number of cameras. In addition to basic packages there are also available optional packages with an extended range of functions. All necessary details are available on the right side of the adjacent table.

Notice: The sensors and detectors are not specified in the list. All will be selected individually for each project according to specific customer requirements.

Languages

T-Complex is available in nine languages: English, German, French, Danish, Swedish, Norwegian, Russian, Turkish and Dutch. Other languages on request.

T-Complex enables to integrate 3rd-party devices

When you will wish to expand T-Complex system for operating with network cameras, video servers and other devices from other manufacturers, our system it enables. The integration possibilities – on request.



T-COMPLEX

PRODUCT PACKAGES, VARIABLE AND SCALEABLE

Product Packages	Base	Standard	Professional	Professional X
Analytical modules				
Fire / overheating detection	optional	✓	✓	✓
Sound Analysis and Detection	optional	✓	✓	✓
Other specific Sensors & Detectors	on request	on request	on request	on request
Other functions				
Live View	✓	✓	✓	✓
Archive View	✓	✓	✓	✓
Alarm Recording	✓	✓	✓	✓
PTZ Control	✓	✓	✓	✓
Maximum No. of Camera Channels	4	8	16	unlimited
Maximum No. of Users (Simultaneous Access)	2	2	4	unlimited
Maximum No. of Recording Servers	1	1	2	unlimited
Central System Administration	✓	✓	✓	✓
Maximum No. of I/O Devices	4	8	16	unlimited
Web Client	✓	✓	✓	✓
Mobile Client	✓	✓	✓	✓
Remote Client	✓	✓	✓	✓
Anywhere (Viewer, Client)	✓	✓	✓	✓
Redundant System Management	X	X	X	✓
Failover Recording (optional)	X	X	X	✓
Multi-level Administration(optional)	X	X	X	✓
Display Agent	X	✓	✓	✓
Active Directory Support	X	X	✓	✓
Layout Plans	✓	✓	✓	✓
Advanced Alarm Scenarios	X	✓	✓	✓
Encrypted Transmission	✓	✓	✓	✓
Motion Scrambling	X	✓	✓	✓
Multi Installation Login	X	X	X	✓
VoIP support	X	X	X	✓
Virtualization/Windows Cluster	✓	✓	✓	✓
Server-based Motion Detection	✓	✓	✓	✓
People and object counting (optional)	X	X	X	✓
Video Analysis (optional)	X	✓	✓	✓
LPR (optional)	X	X	X	✓
Analytics Interface	X	X	X	✓ ¹
Access Control Integration	X	X	X	✓ ¹
Alarm Center Integration	X	X	X	✓ ¹
Intercom Integration	X	X	X	✓ ¹
Monitor Wall Integration (optional)	X	X	X	✓ ¹

¹ We would be happy to provide a list of supported solutions/devices on request.

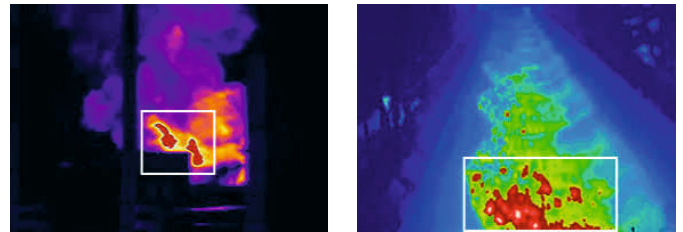
* for detail info see page No.4

T-COMPLEX

HYBRID SYSTEM

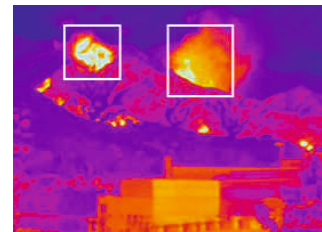
FOR COMPLEX SECURITY

The T-COMPLEX system is the first hybrid surveillance system, which ideally combines the benefits of thermal imaging cameras or other measurement sensors with the features of the CCTV video management software. The combination of the thermal imaging and the CCTV generates new flexible system that offers interesting features.



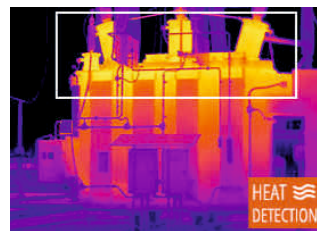
Condition Monitoring & Early Fire Detection

Now you can combine your CCTV system with thermal imaging cameras providing early fire detection function. This function can help to detect hot spots before a fire occurs. It can be used wherever early fire detection is needed in order to prevent extensive damage.



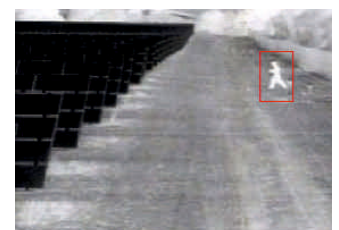
Condition Monitoring & Overheating Detection

This function is similar to the early fire detection function. The overheating detection can be used wherever is need to protect important and expensive equipment against overheating, which can consequently cause dangerous or unexpected situations. Such situations can result for example to the threat of the explosion, damage of expensive machinery and equipment, deterioration in the quality of raw materials and final products, forced to stop production line, etc.



24/7 Imaging Capability Without Lights Or Illuminators

Unlike standard cameras, thermal cameras can complete your security camera system (CCTV) by giving you the ability to see possible threats also at night. Unlike standard cameras, thermal cameras make images from the heat energy emitted by surrounding objects, not from the reflected visible light giving you true 24/7 imaging capability without extra lights or illuminators.



In addition, the thermal cameras enable long range detection, such as 600 meters or one kilometre, while standard CCTV cameras usually cannot see beyond 100 - 130 meters at night. Detection over the colour images would possibly raise more false alarms due to the noise in the image, moving or flashing lights, etc. Such disadvantages will not appear when using the thermal imaging cameras.







MAIN OFFICE

Ahlberg Cameras AB
Gösvägen 22
761 41 Norrtälje
Sweden
Phone: +46 176 20 55 00

R&D

Ahlberg Cameras AB
Ymergatan 12
432 31 Varberg
Sweden
Phone: +46 176 20 55 00

US OFFICE

Ahlberg Cameras Inc.
419 B Raleigh St
Wilmington, NC 28412
USA
Phone: +1 910 399 4240