

## TCAM2500 VISUAL PLUS THERMAL MONITORING SYSTEM

### FEATURES

- Dual visual plus thermal monitoring in a single camera
- Engineered for operation in Electric Power substations
- Automated temperature monitoring of critical assets
- Monitor multiple temperature points /assets
- Notification through SCADA or email
- Storage of temperature readings in system database

### KEY BENEFITS

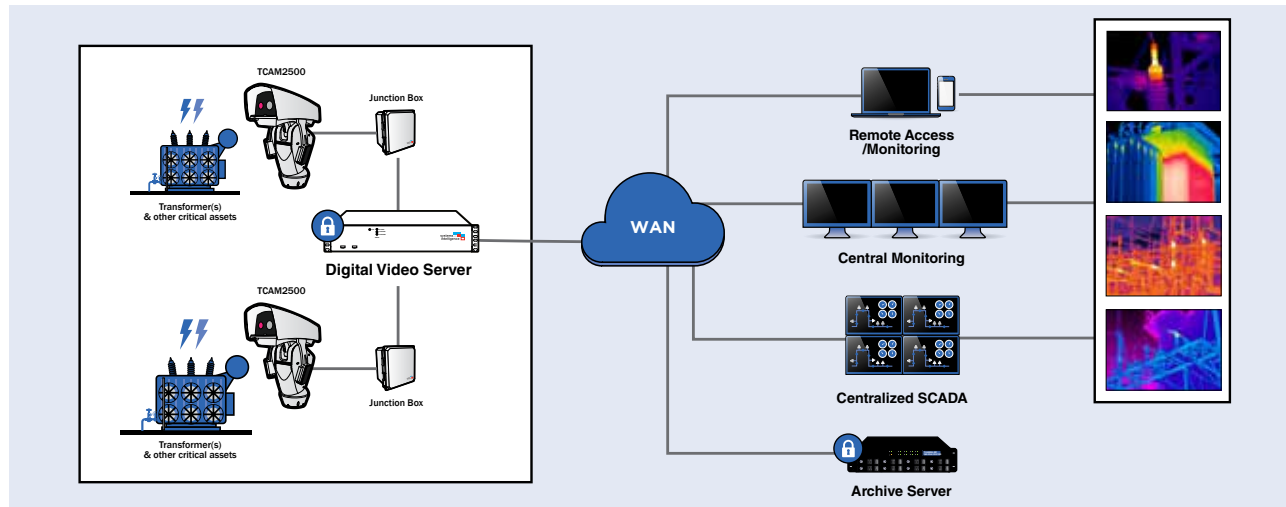
- Thermal temperature readings with visual confirmation
- Reliable operation in harsh environments with high levels of EMI, ESD, voltage surges and interrupts
- More reliable continuous temperature readings under all system load conditions
- Reduced downtime due to unplanned outages by detection of potential problems before failures occur
- Reduced monitoring requirements for operations personnel
- Temperature trending analysis allows input into condition based maintenance program

The risk of outages is increasing on the electric power grid due to its aging infrastructure and lack of automation systems that monitor the condition of critical equipment at substations and along the grid. Transformer fluid leaks or insulation breakdown cause overheating that is a warning of potential failures, but many utilities don't have automated thermal detection systems that can help reveal these problems.

Continuous thermal monitoring systems are able to anticipate, detect, and respond rapidly to problems, thereby reducing the chance of failures, outages and lost productivity. Detection of temperature increases in substation equipment with thermal monitoring cameras allows preventative maintenance operations before an unplanned outage occurs due to asset failure.

The Systems With Intelligence thermal monitoring solution includes a substation hardened digital video server (DVS) that digitally records video from multiple cameras and incorporates a suite of sophisticated video and thermal analytic algorithms for detection of anomalies. The DVS includes software tools for video monitoring and analysis, features flexible networking capabilities and provides automated alarm and event notification.

# SUBSTATION MONITORING ARCHITECTURE



## APPLICATIONS

The Systems With Intelligence thermal monitoring solution can be used to monitor and analyze the thermal signatures of the following substation components. Abnormal thermal signatures are precursors to potential equipment failures.

- Power transformers (oil levels, radiators and pump operation)
- Load tap changers
- Insulator bushings
- Standoff insulators
- Lightning arrestors
- Circuit breakers
- Mechanical disconnects
- Control cabinets
- Batteries

## TECHNICAL SPECIFICATIONS

| SPECIFICATIONS              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| IMAGING PERFORMANCE         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Field of View, focal length | TL01/TS01 = 25° x 19°, 13mm, 324 x 256 pixels<br>TL02/TS02 = 45° x 35°, 7.5mm, 324 x 256 pixels<br>TL03/TS03 = 35° x 27°, 9mm, 324 x 256 pixels<br>TL04/TS04 = 17° x 13°, 19mm, 324 x 256 pixels<br>TL05/TS05 = 13° x 10°, 25mm, 324 x 256 pixels<br>VL01/VS01 = 25° x 20°, 25mm, 640x512 pixels<br>VL02/VS02 = 45° x 37°, 13mm, 640x512 pixels<br>VL03/VS03 = 32° x 26°, 19mm, 640x512 pixels<br>VL04/VS04 = 18° x 14°, 35mm, 640x512 pixels<br>VL05/VS05 = 12.4° x 9.9°, 50mm, 640x512 pixels |
| Resolution                  | 324 x 256 or 640 x 512 pixels                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Detector Type               | Uncooled VOx Microbolometer                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Pixel Pitch                 | 25µm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Scene Range (High Gain)     | -25 °C to 135 °C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Scene Range (Low Gain)      | -40 °C to 550 °C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Time to Image               | <4.0secs                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Video Compression           | H.264                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

| NETWORK                                                                                       |                                                                   |
|-----------------------------------------------------------------------------------------------|-------------------------------------------------------------------|
| Interface                                                                                     | Pan/Tilt Housing: 10/100TX, RJ45                                  |
| Security                                                                                      | Password Protected                                                |
| Protocols                                                                                     | IPv4/v6, DHCP, HTTP, UDP, RTP/RTSP, UPnP, NTP, ICMP               |
| Software Interface                                                                            | Web Server                                                        |
| THERMAL                                                                                       |                                                                   |
| Spectral band                                                                                 | 7.5 to 13.5 µm                                                    |
| Sensitivity                                                                                   | 0.1° C                                                            |
| Frame rate                                                                                    | TL/VL0x = 30Hz, TS/VS0x = 7.5Hz                                   |
| ENVIRONMENTAL WITH PAN/TILT HOUSING                                                           |                                                                   |
| Operating Temperature Range                                                                   | -40° to 85° C                                                     |
| Encapsulation                                                                                 | IP66 (IEC 60529)                                                  |
| Wind Resistance                                                                               | Operational: up to 160km/h<br>Stationary: up to 210 km/h          |
| Resistance to Salty Fog                                                                       | EN50130-5, EN60068-2-52                                           |
| Certifications                                                                                | CE: EN60950-1, EN6095-22, EN61000-6-4, EN55022 Class A, EN50130-4 |
| * The specification for this product may change without prior notice for product improvement. |                                                                   |

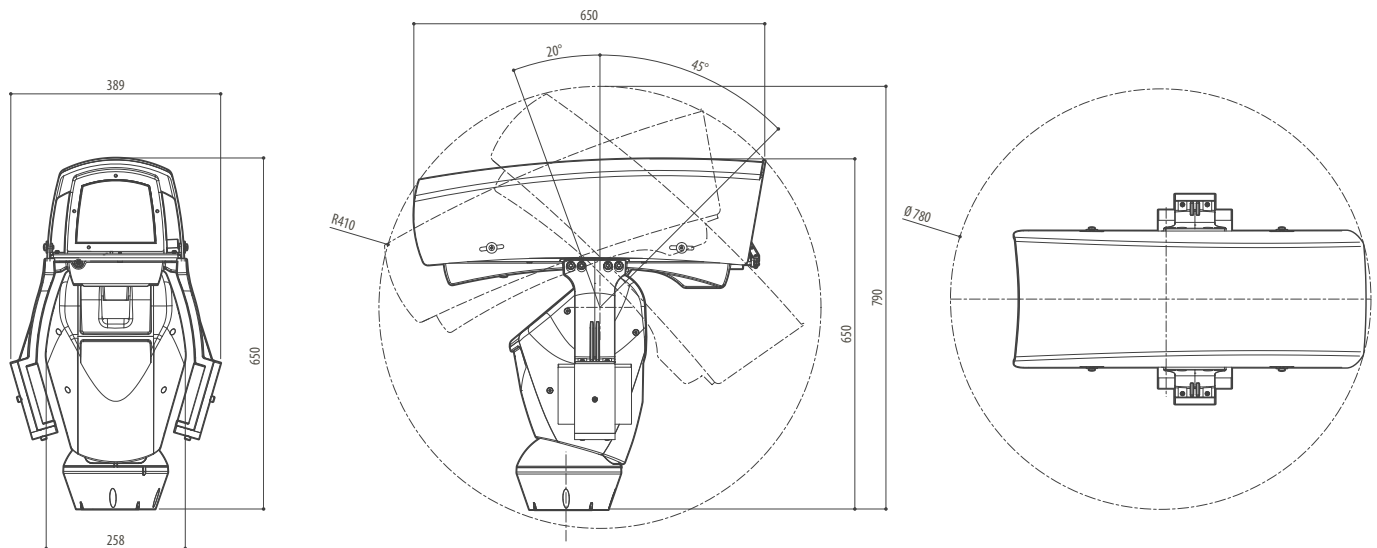
| SPECIFICATIONS: DAY/NIGHT CAMERA                                                              |                                                                                                                                           |
|-----------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| CAMERA                                                                                        |                                                                                                                                           |
| Sensor:                                                                                       | 1/2.8" CMOS Progressive Scan (2MP)                                                                                                        |
| Lens:                                                                                         | Compatible with CS Mount or C Mount with adaptor DC Auto Iris Support                                                                     |
| Day/Night:                                                                                    | IR cut filter removal (ICR) Off/Dusk/Dark/Custom                                                                                          |
| Iris:                                                                                         | DC-Auto/Manual                                                                                                                            |
| Min. illumination:                                                                            | 0.2 lux @ F1.2 (Colour)<br>0.01 lux @ F1.2 (BW)                                                                                           |
| VIDEO                                                                                         |                                                                                                                                           |
| Video Compression:                                                                            | H.264 (MPEG-4 Part 10) MJPEG                                                                                                              |
| Resolution:                                                                                   | 1920 x 1080 (1080p)<br>1280 x 720 (720p)<br>720 x 480 (D1)<br>704 x 480 (4CIF)<br>704 x 240 (2CIF)<br>352 x 240 (CIF)<br>176 x 120 (QCIF) |
| Frame Rate:                                                                                   | 30 fps for all resolutions (except 1080p & 720p-15fps)                                                                                    |
| Video Streaming:                                                                              | Triple Stream: 2ch H.264, 1ch MJPEG<br>Stream-profile: resolution /compression / framerate / video quality                                |
| Analog Video Out:                                                                             | BNC port, NTSC/PAL                                                                                                                        |
| Image Setting:                                                                                | Brightness, Contrast, AWB, Sharpness, Saturation, Gain, White Balance, Auto Exposure                                                      |
| Image Mirroring:                                                                              | Horizontal/Vertical/Both                                                                                                                  |
| * The specification for this product may change without prior notice for product improvement. |                                                                                                                                           |

| SPECIFICATIONS: HOUSING                                                    |  |
|----------------------------------------------------------------------------|--|
| GENERAL                                                                    |  |
| Built in aluminium and ABS                                                 |  |
| Epoxy polyester powder painting, RAL9002 colour                            |  |
| Top mount (OTT)                                                            |  |
| Transmission through toothed belt                                          |  |
| Slip-ring                                                                  |  |
| Electronic limit switches                                                  |  |
| Plug installation thanks to connector and easy replacement on-site         |  |
| Zero backlash                                                              |  |
| MECHANICAL                                                                 |  |
| Cable glands: 3xM16                                                        |  |
| Horizontal rotation: continuous                                            |  |
| Vertical rotation: from +45° up to -20°                                    |  |
| Horizontal speed (variable): from 0.02°/s up to 20°/s through toothed belt |  |
| Tilt speed (variable): from 0.02°/s up to 20°/s                            |  |
| COMMUNICATIONS                                                             |  |
| Ethernet connection: IEEE 802.3 100Base-Tx                                 |  |
| PROTOCOLS                                                                  |  |
| Pelco-D                                                                    |  |

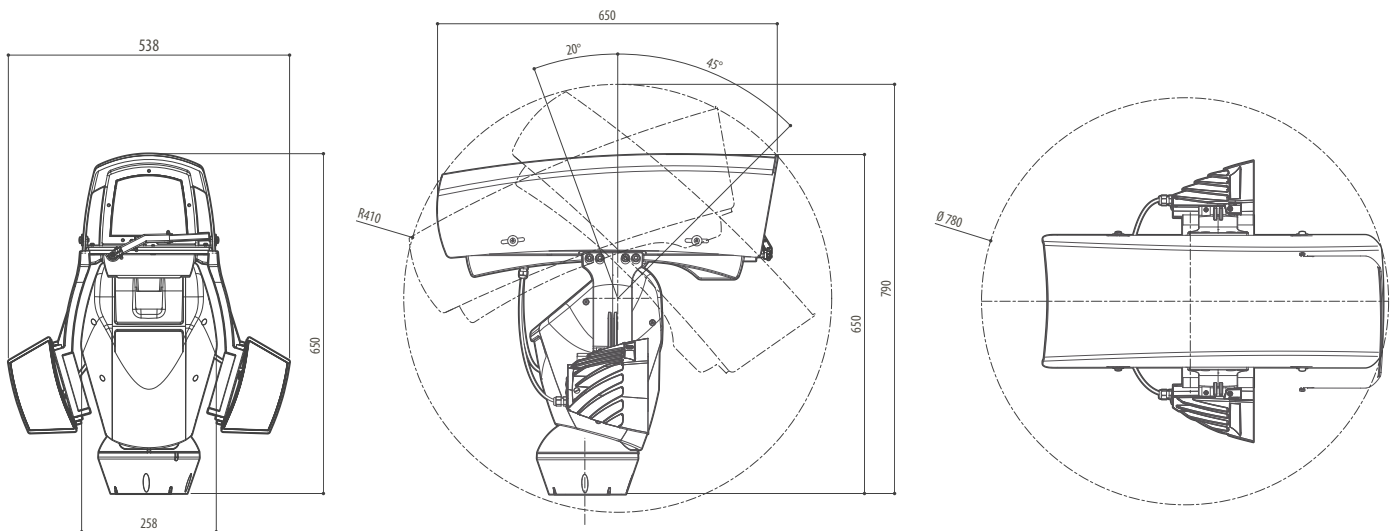
| ENVIRONMENT                                                                                   |  |
|-----------------------------------------------------------------------------------------------|--|
| Indoor/Outdoor                                                                                |  |
| Operating temperature (with heater): -40 °C (-40 °F)/+85 °C (185 °F)                          |  |
| Surge immunity: up to 2kV line to line, up to 4kV line to earth (Class 4)                     |  |
| CERTIFICATIONS                                                                                |  |
| Electrical safety: EN60950-1                                                                  |  |
| Photobiological safety of lamps and lamp systems (LED illuminators): EN62471                  |  |
| Electromagnetic compatibility: , EN55022 (Class A), FCC Part 15 (Class A)                     |  |
| Immunity: EN50130-4                                                                           |  |
| Outdoor installation: EN60950-22                                                              |  |
| IP protection degree: EN60529 (IP66)                                                          |  |
| Resistant to salty fog: EN50130-5, EN60068-2-52                                               |  |
| EAC certification                                                                             |  |
| ELECTRICAL                                                                                    |  |
| 24VAC, 50/60Hz, 100W                                                                          |  |
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## PAN/TILT HOUSING DIMENSIONS Unit: mm

### TCAM2500 with Weights



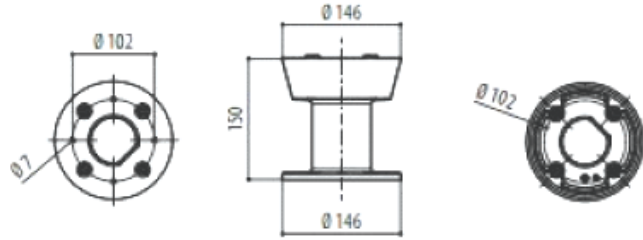
### TCAM2500 with Illuminators



## MOUNTING OPTIONS Unit: mm

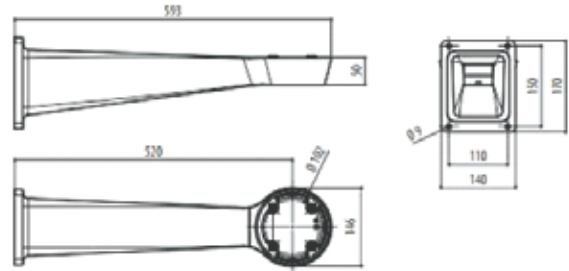
### Parapet Bracket, Option A04

- Made of die-cast aluminum
- Epoxypolyester power painting
- Internal cable management
- Unit Weight: 1.6kg (3.5lb)



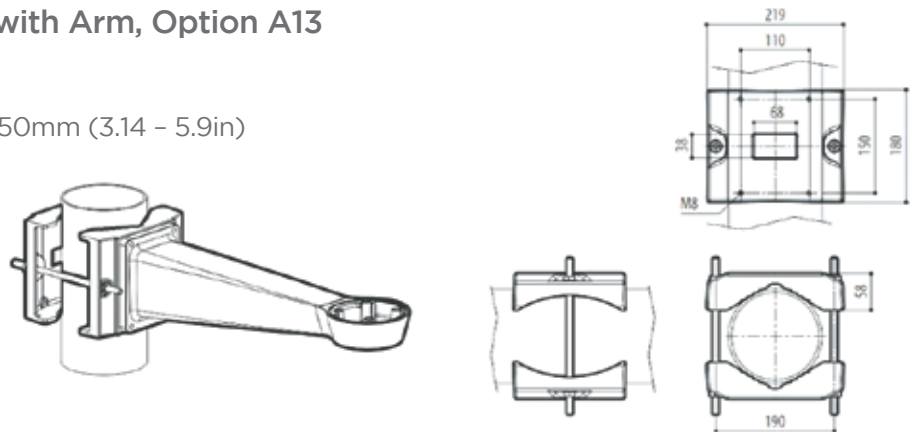
### Wall Mount Bracket, Option A08

- Made of die-cast aluminum
- Epoxypolyester power painting
- Wall bracket with internal cable channel
- Unit Weight: 3.1kg (6.6lb)



### Pole Mount Bracket with Arm, Option A13

- Pole Installation
- Pole Diameter: 80- 150mm (3.14 - 5.9in)



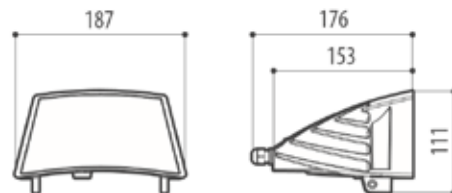
## Accessories

### Illuminator

- Adjustable built-in twilight sensor for automatic activation and deactivation
- Die-cast aluminium body
- Unit weight: 1.5kg (3.3lb)

### Illuminator Power Supply - PS-120IRLED

- 120VAC IRLED Illuminator Power Supply
- Required with PT04 Housing



# CONFIGURATION



| BASE UNIT                                              |  | Description                                               |
|--------------------------------------------------------|--|-----------------------------------------------------------|
| TCAM2500                                               |  | Thermal Camera System with combined Day/Night and Thermal |
| HOUSING                                                |  |                                                           |
| PT03                                                   |  | Pan Tilt Housing - 24VAC                                  |
| PT04                                                   |  | Pan Tilt Housing - 120VAC                                 |
| FIELD OF VIEW                                          |  |                                                           |
| TL01/TS01                                              |  | 25° x 19°, 13mm, 324 x 256 pixels (30Hz/7.5Hz)            |
| TL02/TS02                                              |  | 45° x 35°, 7.5mm, 324 x 256 pixels (30Hz/7.5Hz)           |
| TL03/TS03                                              |  | 35° x 27°, 9mm, 324 x 256 pixels (30Hz/7.5Hz)             |
| TL04/TS04                                              |  | 17° x 13°, 19mm, 324 x 256 pixels (30Hz/7.5Hz)            |
| TL05/TS05                                              |  | 13° x 10°, 25mm, 324 x 256 pixels (30Hz/7.5Hz)            |
| VL01/VS01                                              |  | 25° x 20°, 25mm, 640x512 pixels (30Hz/7.5Hz)              |
| VL02/VS02                                              |  | 45° x 37°, 13mm, 640x512 pixels (30Hz/7.5Hz)              |
| VL03/VS03                                              |  | 32° x 26°, 19mm, 640x512 pixels (30Hz/7.5Hz)              |
| VL04/VS04                                              |  | 18° x 14°, 35mm, 640x512 pixels (30Hz/7.5Hz)              |
| VL05/VS05                                              |  | 12.4° x 9.9°, 50mm, 640x512 pixels (30Hz/7.5Hz)           |
| DAY/NIGHT CAMERA                                       |  |                                                           |
| FZ02                                                   |  | High Definition 10x Zoom Camera, 5.1 to 51mm lens.        |
| BRACKETS                                               |  |                                                           |
| A04                                                    |  | Parapet Bracket for Pan/Tilt Housing                      |
| A08                                                    |  | Wall Mount Bracket for Pan/Tilt Housing                   |
| A13                                                    |  | Pole Mount Bracket for Pan/Tilt Housing                   |
| AXX                                                    |  | No Mounting Accessory provided                            |
| ILLUMINATORS <i>(only available with PT03 Housing)</i> |  |                                                           |
| IR108                                                  |  | 10 degree, 850nm, LED Illuminator                         |
| IR308                                                  |  | 30 degree, 850nm, LED Illuminator                         |
| IR608                                                  |  | 60 degree, 850nm, LED Illuminator                         |

**NOTE:** If illuminators are used with PT04 housing power supply PS-120IRLED is required.



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