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Software and Hardware Complex ITC EYE Compact Technical Data Sheet

RIGA 2016

**Data Sheet
For
"ITC-EYE Compact" Software and Hardware Complex**

"ITC-EYE" is software and hardware complex (SHC) intended for radar less measurement of speed of the vehicles, passing through control zone of a special camera, installed on stationary traffic control post.

Overview

- ✓ Range of speed measured: 1 to 255 km/h.
- ✓ Speed of all vehicles inside a frame is measured independently.
- ✓ Height of the license plate attachment is calculated independently for each vehicle by a purpose-built software module.
- ✓ Possibility of assigning a measured speed value to a wrong vehicle is completely excluded.
- ✓ Camera may be installed on an arch above the road or on a console beside the road. Camera may be placed at an angle relative to the centre of an observed lane. Observation "across one lane" is also possible. Maximum angle relative to the traffic – up to 30 °.
- ✓ Speed is measured for both approaching and withdrawing vehicles using both front and rear license plates.
- ✓ Speed is measured using license plate of any supported format regardless of size, shape, colour or number of lines. Presently complex supports approx. 300 types of license plates.
- ✓ External factors do not influence results of the measurement.
- ✓ Camera can't be remotely detected by any technical means.

Metrological and technical characteristics of "ITC-EYE Compact"

- ✓ Range of speed measured: 1 to 255 km/h.
- ✓ Maximum permitted measurement discrepancy: ± 2 km/h
- ✓ Range of camera installation height, 4,5...11 m
- ✓ Vertical inclination of the camera relative to road surface ...° 12...30
- ✓ Horizontal angle of the camera relative to vector of traffic in the lane, ...° 0...30
- ✓ Power supply: - alternating current 230 V, 50 Hz
- ✓ Power consumed, incl. heating VA, not exceeding: 230 VA
- Average running time before breakdown, at least 10 000 h.

Environmental conditions:

- ambient temperature, ° C -40 to +50°
- relative humidity at 30° C, % 90
- atmospheric pressure, kPa 84,7 to 106,7

Wide range of speed measured

“ITC-EYE Compact” SHC measures vehicle speed between 1 and 255 km/h.

Maximum measurable speed is limited to 255 km/h. At this speed system is guaranteed to be able to capture at least 2 frames within control zone with license plate visible and conduct license plate recognition and measure vehicle speed with permitted discrepancy.

Minimum speed value is not limited, system is able to register static and slow moving vehicles.

However, since it is an accepted practice to use speed values expressed in whole numbers, minimum speed value is set to be 1 km/h.

Simultaneous speed measurement for several vehicles.

If several vehicles simultaneously enter control zone of the camera, speed of each one will be measured independently.

Unlike the radars SHC “ITC-EYE Compact” does not emit radio signals, but measures speed based on the movement of vehicle’s license plate. Therefore, regardless of the number of license plates in the control zone, speed of each vehicle shall be measured independently.

Calculation of license plate's attachment height.

Radar less speed cameras use height of the license plate attachment above the road surface to calculate the distance travelled by the vehicle, bearing recognised license plate. Some obsolete models of speed cameras use statistic height of license plate attachment. However, in many cases statistic height does not correspond to actual attachment height, which severely affects precision of measurement. SHC “ITC-EYE Compact” Calculates attachment height for the license plate of each vehicle independently, thus insuring high precision of each measurement.

Possibility of error via assigning of measured speed value to a wrong vehicle is completely excluded.

Radar based speed measuring equipment has one inherent flaw: one device measures speed of the vehicle, yet image of the vehicle is captured by another, which often results in situations, when speed of one vehicle is measured, yet image of another vehicle is taken.

SHC “ITC-EYE Compact” is completely free of this flaw due to it’s method of operation. Speed is calculated based on movement of the license plate which unambiguously identifies the vehicle. Therefore, if license plate is recognised correctly and speed is properly calculated, it may be assumed that speed is calculated for this particular vehicle. This results with less demanding installation requirements.

Camera of SHC “ITC-EYE Compact” may be installed on the arch above the road as well as on the console beside the road. Unlike the radar, camera may be installed at up to 30° angle relative to the centre of the monitored lane.

Measurement of speed regardless of traffic direction

SHC “ITC-EYE Compact” measures speed regardless of the direction of traffic within control zone of the camera, using both front and rear license plates. Speed is measured for all vehicles with supported license plate types regardless of their shape, colour, size and format (including two lines). Presently, approx. 300 types of license plates are supported: 20 European countries, Russian Federation licence plates, almost all CIS plates.

No influence of external factors

Radar based speed measurement equipment emits radio signals, which may be intercepted by radar detectors. "ITC-EYE Compact" SHC emits nothing in the course of operation and looks like a regular CCTV camera. Radar detectors cannot detect measuring unit and therefore violators can not avoid detection.

Camera is statically installed 4,5 to 11 m. above the road and keeps certain area thereof under observation; this is referred to as control zone. "ITC-EYE Compact" software installed to the computer processes images it receives every 40 ms, detecting all vehicles with license plates and measuring their speed.

"ITC-EYE Compact" mode of operation

Measurement of speed of a vehicle is based on separate measurement of distance travelled by vehicle in the control zone and time it took vehicle to travel this distance. Movement of a vehicle is calculated, based on movement of a stable, definitely identifiable point of a vehicle – centre of its license plate. Measurements are based on two frames with an image of a vehicle with visible license plate. Software captures first frame and performs recognition of license plate (entry into control zone), makes a timestamp. Then, based on the speed of a vehicle, software captures several more frames with license plate visible at 40 ms intervals, until the vehicle leaves camera's field of view. Software then timestamps last frame with visible license plate (departure from control zone). By counting number of frames between the first and the last, software determines time, during which vehicle was present in the control zone (given that interval between frames is 40 ms in PAL standard). Software has special stabilisation algorithm, which compensates vibration of a structure, where camera unit is installed. Structural vibrations caused by passing traffic or wind may result in additional discrepancies during calculation of distance. Therefore, before calculating distance, above mentioned algorithm is used to account for vibration. Afterwards distance travelled by the vehicle, between position visible on the first frame and that on the last, is calculated. In order to do so, coordinates of the base point (centre of the license plate) are determined on the first and on the last frame. Frames are visually superimposed and movement vector is constructed within coordinate grid of the frame.

By using parametres of relative position of the camera and control zone, determined during calibration, software converts vector of movement from pixels of a frame into millimetres of road surface. System takes account of the fact that projection of a single pixel on the road surface has different scale along y axis (along the road) and x axis (across the road). This allows to measure movement along both x and y axis precisely, thus permitting installation of the camera at an angle of up to 30°, instead of mounting it exactly above the road.

Such calculations might have been final, if control point would have been moving directly on the road surface. However, in reality license plate is attached to a vehicle a certain distance above the road. This means that distance, actually travelled by the base point (centre of the license plate) will be shorter than its projection onto the road surface. Height, at which license plate is attached between 300 and 1200mm (2000mm in exceptional cases). In other words, attachment height for a particular vehicle is not known. Therefore, any speed measurement thus made will be imprecise as it contains additional discrepancy.

Calculation of license plate attachment height

"ITC-EYE Compact" includes special module that calculates height, at which license plate is attached.

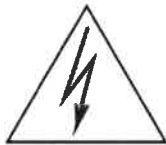
Its operation method is following. Knowing precise dimensions of a license plate (generally 520x112mm, character height 78mm) and after determining size of its image in a frame, taking into account geometric parametres of relative position of the camera and its control zone, established during calibration, software module is able to establish distance between matrix of the camera and a license plate. Then, height, at which the camera is installed, is taken into account, thus converting distance into attachment height of the plate above the road.

Precision of these calculations may be influenced by several factors:

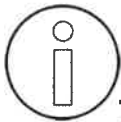
- three angular aberrations: irregularity of attachment (license plate is visibly not parallel to road surface); attachment of the plate at an angle relative to the camera and attachment to the surface, other than front of the vehicle;
- convex or concave shape of the plate;
- control zone observed at an angle relative to traffic flow.

Software analyzes image of a license plate for presence of each of these factors separately. If detected, factor is accounted for. If edges of a plate are covered by a plastic frame, it is compensated by measuring space between characters. This allows software to determine size of single line plates as well as plates with multiple lines or sizes of plates deviate from standard.

During calibration relief of the road surface (lengthwise and crosswise inclination) are determined and taken into account during all calculations.



Some components of a complex are under the dangerous voltage.

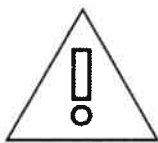


The system of data transmission

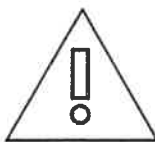
Data transfer system is not delivered with "ITC-EYE Compact" SHC.

Depending on requirements of the Customer and special conditions various systems of data transmission, wired system or wireless system can be used.

Used system must protect against an overvoltage, an overcurrent and short circuit, conforming to standards EN 61010-1.



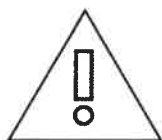
Before installation of the COMPLEX, please, read instruction for external montage of the equipment.



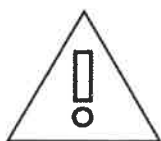
Safety requirements

Mains 230V 50 Hz line that powers ITC EYE Compact must be fitted with 2P C2A automated switch. This switch should insure powering down of the complex in case of emergency or for the purpose of maintenance works.

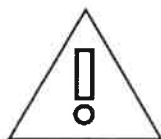
Metal structures, onto which ITC EYE Compact complex is installed, should be securely earthed. Only qualified personnel may perform maintenance and repair works. If an emergency arises, power down all elements of the complex either by means switch 2P C2A, or by means of automated switch that disconnects main power line to the complex.



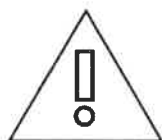
A readily accessible 2- pole back-up disconnect device must incorporated in the power supply cable. Max rated current 2 A of 2- pole disconnect device specified in the instructions.



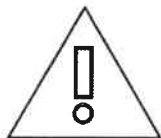
During calibration of the device, attach display and mouse to the INTELCAM External Connection Box with caution.



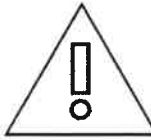
Adequate protection means provided in the EUT and in the associated equipment that comply with standard EN 61010-1.



The manufacturer declare only power supply cable for outdoor installation with minimal cross-section 3x0,75mm², if used optional IR-spot, the minimal cross-section of power supply cable must be minimum 3x0,75 mm².

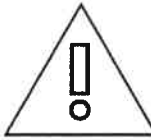


No parts on the supply side of EUT that remain energized when disconnect device is switched off.



Only service specialists can provide installation and technical support.

All elements and components of ITC EYE Compact are EN 61010-1 compliant.
In some elements and components of ITC EYE Compact, dangerous high voltage is present.

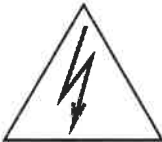


Use fuses with the specified parameters only.

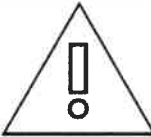
Inside INTELCAM External Connections Box (IECB) use Fuse F2 AL in 230 V AC circuit.
Inside IR-spotlight Power Supply Unit (IR-PSU), optional unit, use Fuse T2 A in 230 V AC.

Using the device contrary to this manual may cause electrical safety level to be lower.

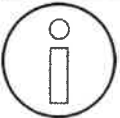
Safety Signs and Symbols.



- Danger High Voltage



- Warnings



- Product Information



- Read operator's manual.

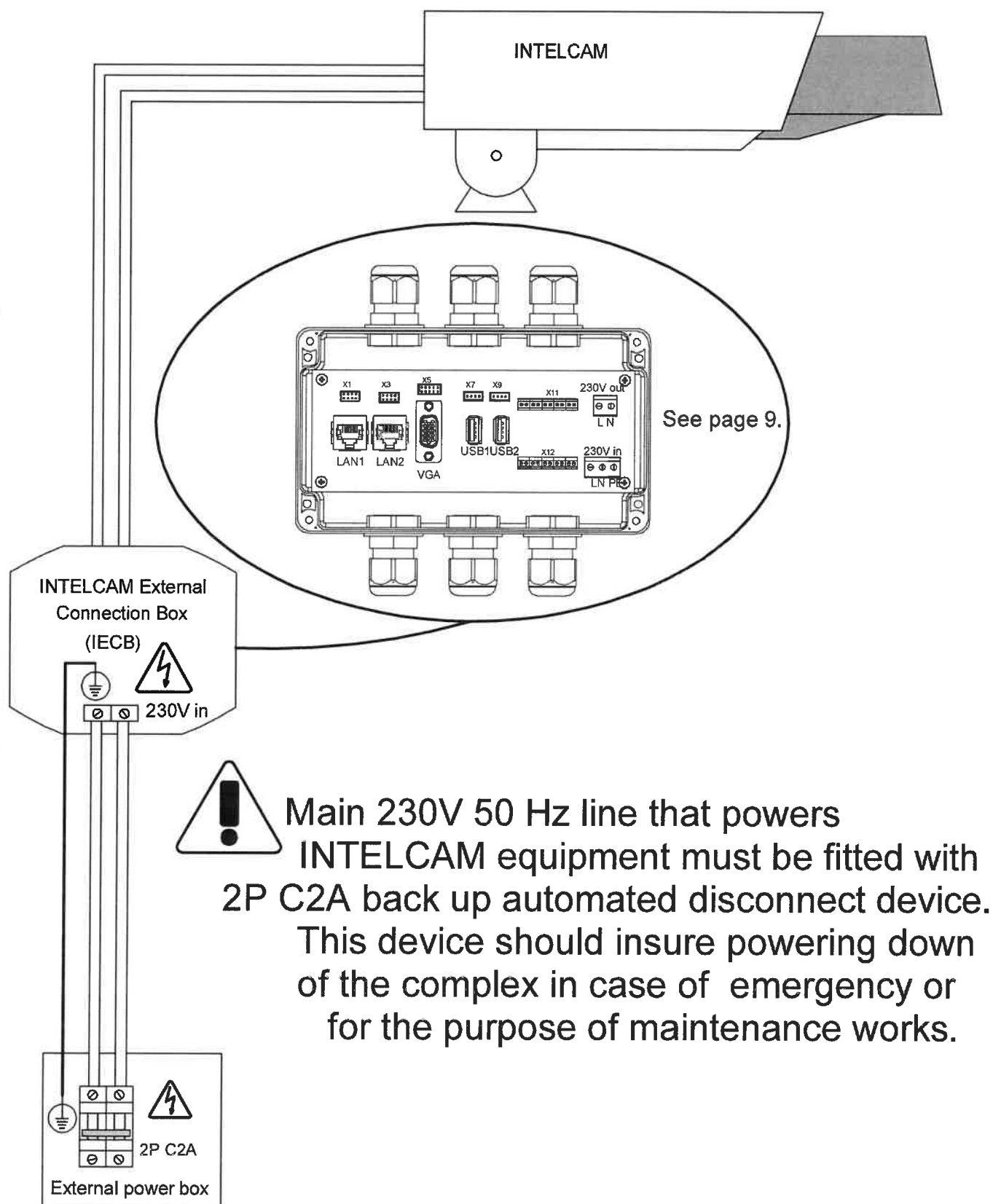


- Hot Surface.

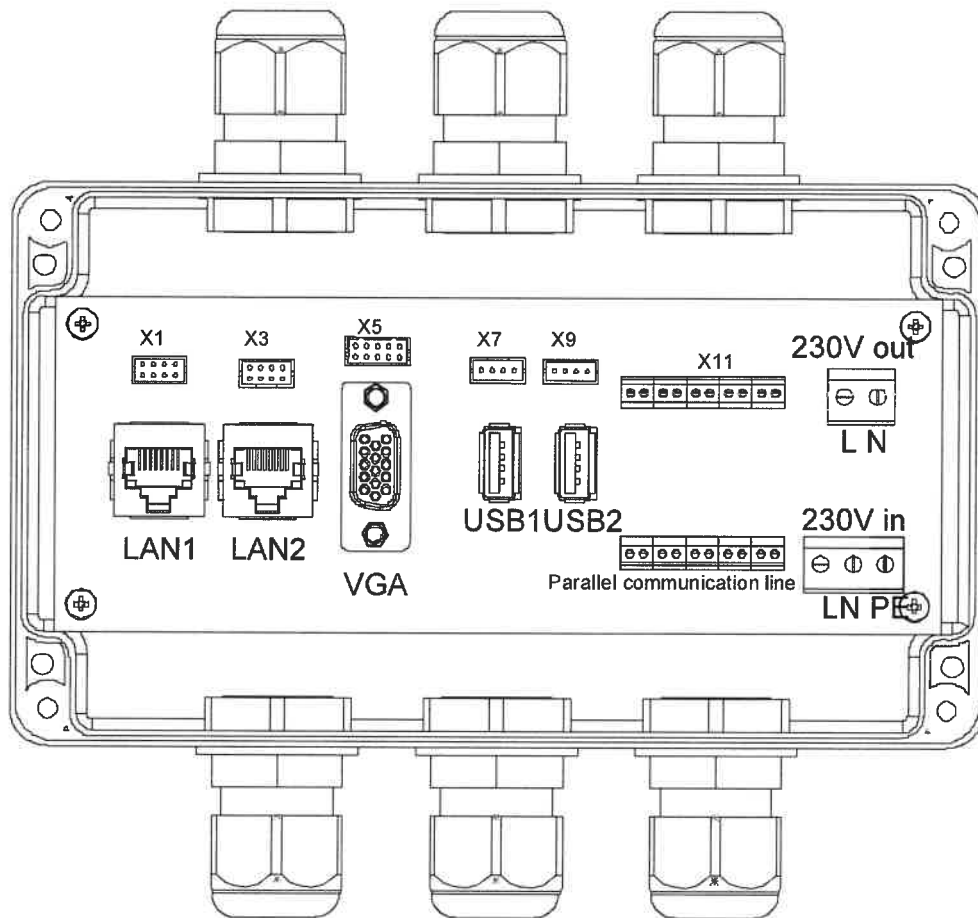
ITC EYE Compact Equipment Specification

Pos.	Legend	Part No.	Designation of electrical components	Q-ty	Manufacturer	Note
1	IECam	INTELCAM	Video Sensor & Main Processor	1	ITC Traffic Ltd.	
2	IEECB	IEECB	INTELCAM External Commutations Box	1	ITC Traffic Ltd.	
3	IR-S	100B-15	IR-Spotlight	1	ITC Traffic Ltd.	Optional
4	IR-PSU	IR-PSU	IR-spotlight Power Supply Unit	1	ITC Traffic Ltd.	Optional

External power connection diagram



INTELCAM External Connection Box



LAN1 and LAN2 connectors is designed for connection to data transmitting system.

VGA connector is designed for external monitor connection during equipment calibration.

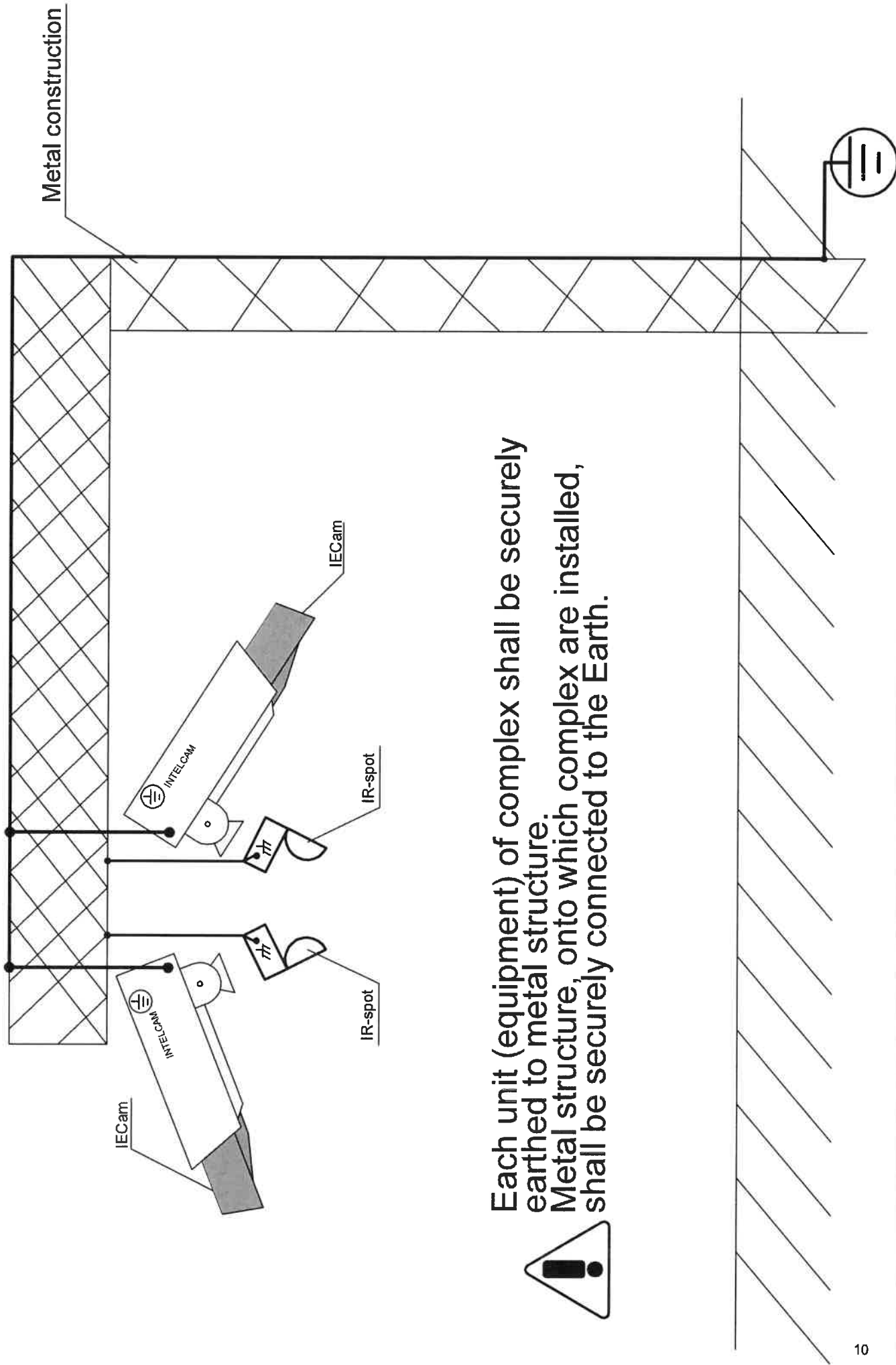
USB1, USB2 connectors is designed for USB devices and programm security key.

Parallel communication line connector is designed for RS485 interface.

Power supply connect to 230V in.

Connector "230V out" is designed for power supply optional IR-spot.

Electrical diagram of external grounding



Each unit (equipment) of complex shall be securely earthed to metal structure.
Metal structure, onto which complex are installed, shall be securely connected to the Earth.



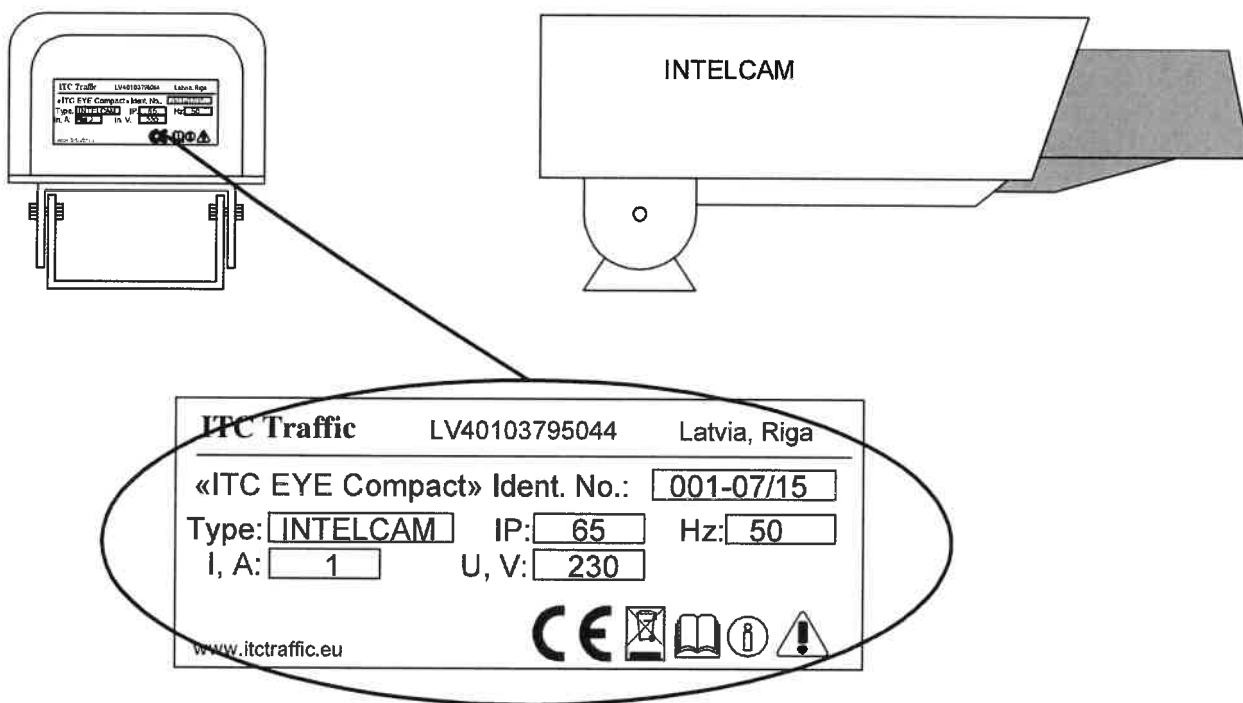
ITC EYE Compact Data Sheet

Sertificate No. Compact - 07-2015/001
Manufacturer SIA "ITC Traffic"
Item title ITC EYE Compact
Project ITC EYE

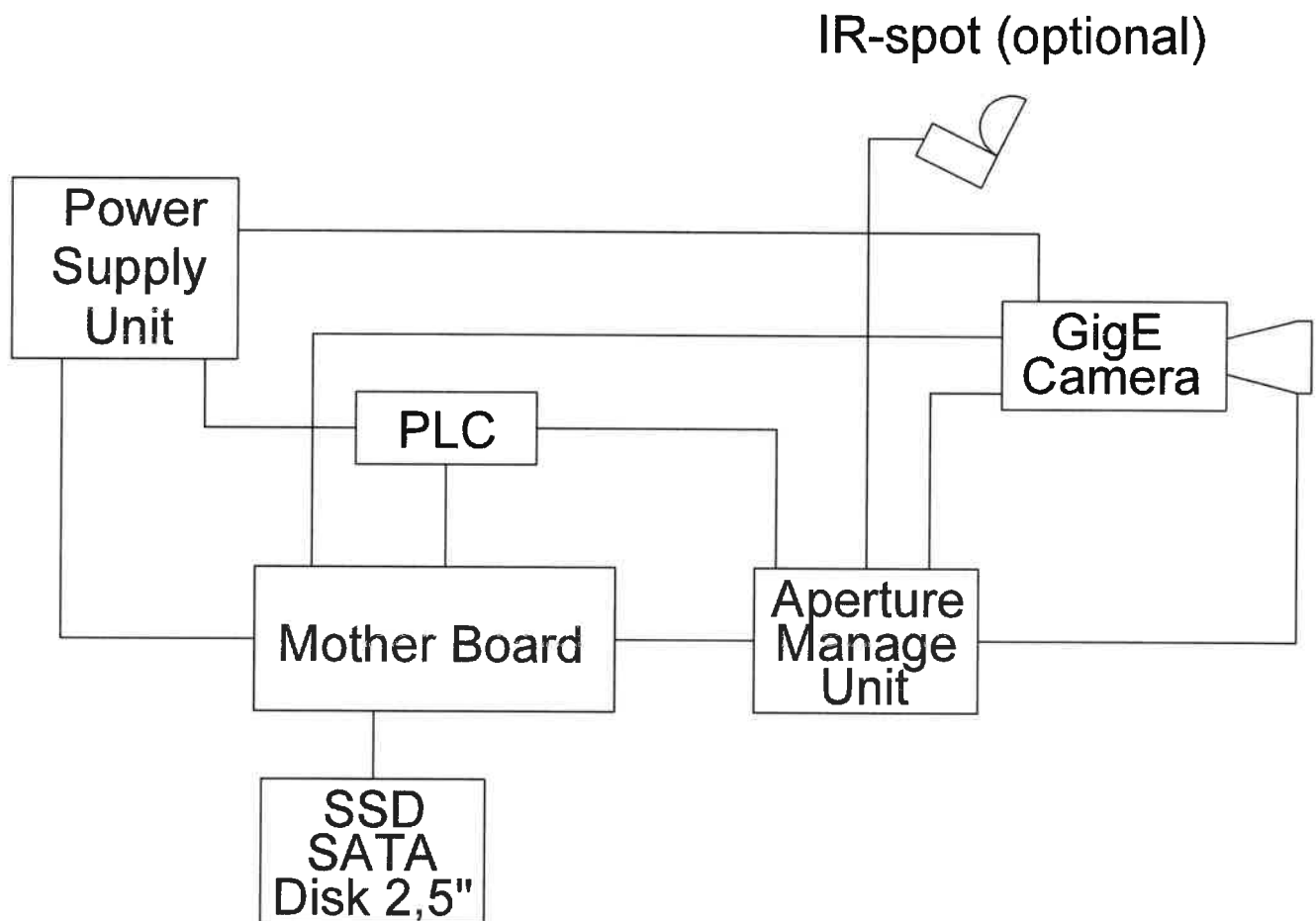
Technical Parameters

Dimensions	<u>553 x 180 x 124 mm</u>
Protection category	<u>IP65</u>
Input Nominal current, A	<u>1</u>
Input Nominal voltage, V	<u>230 AC</u>
Control voltage, V	<u>12V DC / 5 V DC</u>
Rated Frequency, Hz	<u>50</u>
Output voltage, V	<u>230V AC</u>
Distribution (laying)	<u>Exposed</u>
Working Temperature, °C	<u>-40 - +50</u>
Weight, kg	<u>6,4</u>

INTELCAM IECam Total View



ITC EYE Compact Functional Diagram



ITC EYE Compact mounting

The device is installed on a flat surface at least 130 x 130 mm and is fixed by M8 bolts with washers and nuts. The base must be resistant to mechanical and wind influence.

The power supply cable must be for outdoor installation with minimal cross-section 3x0,75mm², if used optional IR-spot, the minimal cross-section of power supply cable must be minimum 3x0,75 mm².

Base mounting template

