PUMATRONIX

ITSCAM FF 600

HIGH POWER ON IMAGE PROCESSING

Product

Pumatronix Equipamentos Eletrônicos Ltda.

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Change History

Date	Revision	Content updated
04/20/2022	1.0	Initial Version
04/29/2022	1.1	IP Protection update
01/13/2023	1.2	Update of the Connections Board model and specifications; Correction of the Case internal temperature; Update of estimated weight; Update of Electrical Specifications
05/29/2024	1.3	Updating of models; Update of *Classifier* specifications; Update of Mechanical Specifications; Update of minimum and maximum consumption; Naming updates in Image Capture Architecture; ITSCAMPRO Móvel interface update in version 2.12.0

Revision 1.3

Overview

The ITSCAM 600 Family offers a powerful image processing engine and the flexibility to embed custom software, enabling adaptation to specific project needs. In addition, it provides connectivity through cables, Wi-Fi or mobile data to ensure seamless communication in any scenario.

Our latest technology enables authorities, technicians and urban managers to interact in real time, transforming the management of cities' infrastructure. This results in safer and higher quality urban environments for citizens, while enabling agile and effective actions to promote sustainable growth of smart cities.

The ITSCAM FF 600 is a low-energy equipment, making it a viable option for solar power, demonstrating our commitment to sustainability. This versatility is reflected in applications ranging from traffic control systems and urban mobility to public and private security monitoring, customs, parking and access control, as well as highway concessionaires.

Figure 1- ITSCAM FF 600

Being a state-of-the-art device, it is designed to offer total security and integrity to the captured data. Equipped with Digital Signature, this technology ensures that the information received by the end user can be validated and in case of attempted alteration or manipulation of the data, will be promptly identified, providing absolute confidence in the authenticity of the information. In addition to this security applied to the information generated, the ITSCAM 600 Family has data Encryption, which can be used as an additional layer of protection in accessing the device and sending data to servers, which ensures that only authorized recipients have access to the images. This security measure prevents unauthorized individuals from intercepting or viewing the information, maintaining the privacy and confidentiality of the data at all times.

The ITSCAM 600's video capture technology includes a video encoder that supports H.264, H.265 and MJPEG formats, plus a 2MP Shutter global sensor with HDR sensor or 2.3MP Shutter global sensor on FHD models, optimized to minimize the negative effects of inadequate lighting and ensure sharper night images. The result is superior image quality, even in challenging weather conditions, providing accurate license plate reading in high traffic environments, ideal for free-pass flows or Free Flow systems.

In addition, the ITSCAM 600 Family features an open platform that enables video capture and processing directly on the device, eliminating the need for computers and routers. Its sturdy metal structure provides excellent heat dissipation, while simultaneous processing of up to 3 track lanes, hardware Flash timing and low power consumption ensure superior performance in a variety of applications. The ability to delimit

specific areas of interest with the ROI (Region of Interest) function further extends the possibilities of motion detection by the algorithm.

With flexibility in the choice of lenses, Pumatronix offers options for models with CS external lenses, as well as models with LM motorized lens, all equipped with a CMOS sensor with Global shutter for images without drag. Thus, the system is able to operate the image capture of vehicles with speed up to 180 km/h in models with the 2MP sensor and up to 200 km/h in models with the 2.3MP sensor, providing accurate readings in high-speed scenarios.

With technical support throughout the country and the possibility of configuration and installation by a specialized technical team, the Pumatronix ITSCAM 600 is the definitive choice for your high-speed license plate reading needs. Consult your vendor to learn more about how this solution can optimize your operations and improve security in your environment.

Handling Risks

ANATEL	**Models** *ITSCAM FF 600 FHD LM AD IOT (CP1I4) and ITSCAM FF 600 LM AD IOT (CP1I5)* **contain the boards EC25-AUFA-512-STD and ATWILC3000-MR110UA, approval code Anatel 06239-18-07968/0142417-03464.**
⚠	**Electric Shock: Handle the ITSCAM FF 600 carefully, as it operates with 127 or 220 Volts (AC) and while installing the external power conductor on the product's** *Connection Board*, **it must always be executed with the power off to prevent shock risk.**
⚠	**Risk of Infiltration: To prevent liquids inflow, the unused cable gland must remain cordless and closed, with the rubberized protector simulating the installation wire.**
⚠	**Oxidation Risk: The electrical and signal connections, made in the ITSCAM FF 600 bundle and in the data network cable, must be protected in a terminal box or similar structure to avoid the unwanted infiltration of liquids in the bundle and the consequent ITSCAM FF 600 connections oxidation.**
⚠	**Installation Spot: In cases where it is not possible to meet the installation specifications, it is recommended to consult Pumatronix Technical Support.**
⚠	**Loss of Warranty: The absence of an electrical grounding system may cause the ITSCAM FF 600 to burn and the user must correctly ground the product.**
⚠	**Loss of Warranty: Appropriate conductors must be used, with a gauge compatible with the cable gland's, at risk of water infiltrating the product. Likewise, the unused cable gland must remain cordless and closed, with the rubberized protector simulating the installation wire, in order to prevent liquids inflow.**
⚠	**Loss of Warranty: The parts that make up the ITSCAM FF 600 must not be changed, and the user cannot perform any repairs on the product.**

Models

The ITSCAM FF 600 image capture and processing device reads license plates in places with adequate ambient lighting and in situations with low light, it is necessary to separately acquire one illuminator per monitored lane, up to a maximum of two illuminators, such as Pumatronix's ITSLUX or compatible lighting equipment.

Available models	Resolution	Lenses Type	Estimated range (in meters) *
ITSCAM FF 600 (CP1I5)	1636x1220px HDR	Integrated Motorized	10 a 37m (13-55mm)
ITSCAM FF 600 LM AD IOT (CP1I5)			
ITSCAM FF 600 LM AD (CP1I6)	1920X1200px		4 a 45m (4.7-47mm)
ITSCAM FF 600 FHD LM AD (CP1I3)			

*The estimated range is set according to the selected lens and identifies in which distance range the vehicle license plate characters remain legible in the OCR reading. The motorized lens type cannot be modified, as it is an integral part of the equipment's electronic circuit.

Protective Box	ITSCAM 600 device model applied*
CP1: no heating	**I3**: ITSCAM 600 FHD LM AD (S09L3N2AJP)
	I4: ITSCAM 600 FHD LM AD IOT (S09L3W1N2AJP)
	I5: ITSCAM 600 LM AD IOT (S06L5W1AJP)
	I6: ITSCAM 600 LM AD (S06L5AJP)

*For more information about the model and features of the applied image capture and processing device, access the ITSCAM 600 product manual.

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1. Knowing the Product

The ITSCAM FF 600 line of image capture and processing devices was developed for traffic management, surveillance, Smart City Applications, mobility systems, parking lots and applications that require image capture. The 2MP image sensor of the ITSCAM FF 600 enables capturing and processing images up to two lanes and the 2.3MP image sensor that features the ITSCAM 600 FHD device enables the capture and processing of images from up to three track lanes. The sensor is combined with a motorized-type lens assembly.

The quality and level of detail of the images captured with ambient and ITSCAM FF 600 artificial lighting come from additional functionalities to the optical set (image sensor with lenses). On models with 2 MP image sensor there is a proprietary HDR (High Dynamic Range) algorithm, to highlight the details of image very dark and very light regions. *Multiple Exposures* can be captured for each photo request made to the equipment. This feature captures and processes more than one sequential image, with capture parameters automatic variation.

ITSCAM FF 600 maintains the images standardization, even when there are significant variations in light conditions. This is possible by switching the image configuration *Profiles*. Profile changes are made by the equipment, based on the image level and time.
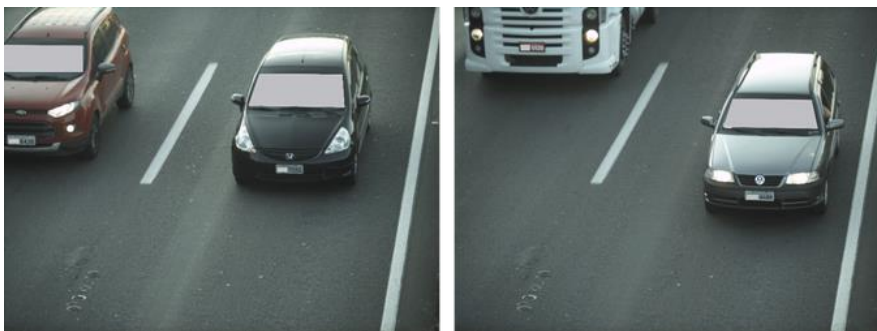

Figure 2 - Examples of daytime images captured with ITSCAM FF 600

Figure 3 - Examples of night-time images captured with ITSCAM FF 600

ITSCAM FF 600 hardware models have 4 input or output ports (IOs), the IO1 and IO2 are dedicated to the control of artificial lighting (flash), which are usually activated automatically in low light situations. IO3 and IO4 are available for the installation of external sensors, such as loops and light barriers, which identify the moment of image capture (*trigger*). However, ITSCAM FF 600 can capture images without external sensors, enabling the activation of capture by software (*Motion Detector*).

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All images captured by ITSCAM FF 600 pass through the Quad-Core with neural network accelerator, which scans them for vehicles. Identification extends to distinguishing between *motorcycles*, *cars*, *trucks* and *buses*, as well as reading characteristics such as *brand*, *model* and *color*. This function is called Classifier and can be performed with high precision, detecting vehicles even in situations where the license plate is missing or the characters are not very distinct. Along with identifying the type of vehicle in the Classifier, it is possible to define regions that operate the Virtual Loop in the image (Virtual Trigger Regions). In addition to characterizing the vehicle present in the image, automatic characters recognition of the vehicle license plate (*OCR*) for the old Brazilian and Mercosur standard is available. Refer to Pumatronix Commercial for availability of OCR recognition from other Mercosur countries.
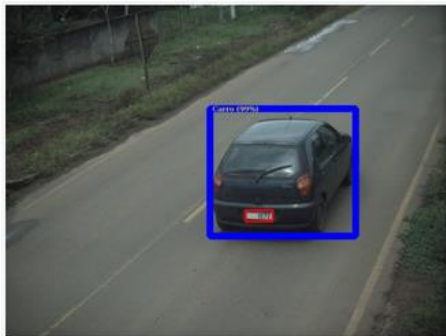

Figure 4 - Classifier identifies a car
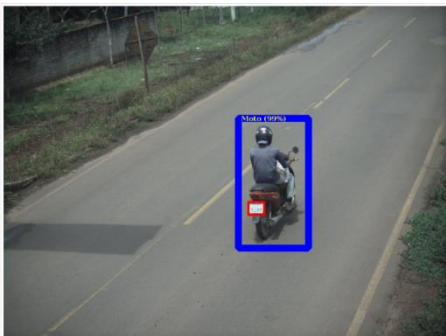

Figure 5 - Classifier identifies a truck

Figure 6 - Classifier identifies a bus

Figure 7 - Classifier identifies a motorcycle

ITSCAM FF 600 delivers photos in JPEG format with 1636 x 1220 pixels resolution and the ITSCAM 600 FHD delivers photos in JPEG format with a resolution of 1920 x 1200 pixels. Within these files, the comments field is filled with the data referring to each capture, containing the image spot coordinates, the recognized plates, the type of vehicle identified and the equipment instant configurations.

ITSCAM FF 600 line provides 2 Gigabit Ethernet ports on the back panel of the ITSCAM 600 device to facilitate connectivity at monitoring points and allow remote and simultaneous access for multiple users. Accesses can be through the Web Interface of the equipment or applications can connect using the REST API, File Transfer Protocol (FTP) protocol), the ITSCAMPRO server or the Lince(R) platform. Equipment access management is done by specifying the network firewall rules or by specifying the *Routes*. The commands available through the REST API are detailed in the ITSCAM 600 Integration Manual.

The *ITSCAM FF 600 LM AD IOT (CP1I5)* and *ITSCAM FF 600 FHD LM AD IOT (CP1I4)* models have additional connectivity features. The 4G e 3G mobile cellular technologies are available for connection to the

equipment, as well as Wi-Fi and IoT M2M communication. The images captured by these ITSCAM models can be georeferenced automatically, as long as an external antenna is connected to receive the GPS signal.

2. Further Documentation

Product	Link	Description
ITSCAM 600	Product Manual	ITSCAM 600 Product Manual
ITSCAM 600	Integration Manual	Programming and integration manual containing the necessary information for the integration of ITSCAM 600 with an application.
ITSCAM FF 600	Installation and Maintenance Guide	Guide containing the information necessary to install and mantain ITSCAM FF 600.
ITSLUX	Product Manual	ITSLUX Illuminator Manual
ITSCAMPRO Móvel	Product Manual	ITSCAMPRO Móvel Software Manual

3. Information Generated

The ITSCAM FF 600 devices line captures images of up to three track' lanes in JPEG format and automatically provides Brazilian vehicle license plates characters (in the old and Mercosur standard). The plates read in the images, the type of vehicle captured and information about the equipment setup are stored inside the image files, in the JPEG field for the storage of comments. The quality of the JPEG files generated is adjustable and the images can receive a text overlay of with configurable content in each *Profile*. For each photo request, sequential captures can be sent with changes in the capture parameters (*Multiple Exposures*). The captures can be viewed through the interface on the Snapshot and Trigger screens, which present the user with the image's metadata, such as data on the vehicle type (whether Car, Motorcycle, Bus or Truck), the brand, model and color of the vehicle identified by *Classifier* and the license plates identified in OCR *Recognition*.

The images captured by ITSCAM FF 600 can be redirected via wired data network (using the independent Gigabit Ethernet ports), via Wi-Fi network or using 4G and 3G mobile data networks. Using the communication interfaces, the ITSCAM FF 600 images can be automatically sent via the device's Web Interface or applications can connect using the REST API Client, the FTP protocol (File Transfer Protocol), the ITSCAMPRO server or the LINCE server.

Additionally, equipment operation and captures can be monitored in real time through the ITSCAM 600 Web interface or the ITSCAMPRO Móvel plugin, which presents captures data through the interface in the *Log Report*, detailed in Software Specifications. The video with the capture images is available in MJPEG, H.264 or H.265 format with adjustable quality, in addition to the live view available in a floating window, which can be scrolled or minimized and which optionally displays only the images of the captures made, with the possibility of adjusting the zoom and focus for the current profile.

The Status information is available on the home screen, which shows the device's data, such as Device ID (or Serial Number), installed versions, CPU performance status, memory and storage, GPS and Inputs and Outputs.

4. Mechanical Specifications

- Protective housing material: Steel with painted finish;
- IP protection: IP66;
- Attaching: through the *Pole Bracket* that comes with the product. Further attaching information can be found in the ITSCAM FF 600 Installation and Maintenance Guide.
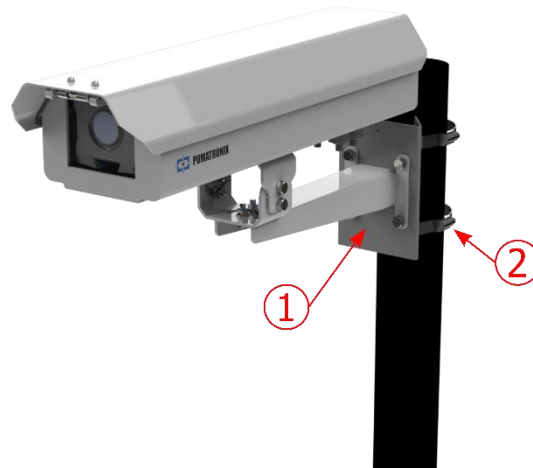

Figure 8 - Pole fastener: 1) Pole bracket; 2) Stainless steel clamp

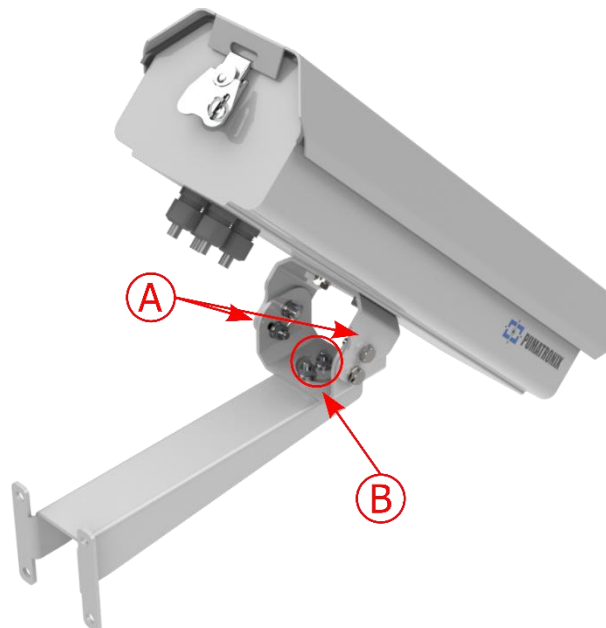- Framing adjustment: with movement of the joint at equipment base

Figure 9 - Possible adjustments to the joint at equipment base: A) Vertical inclination; B) Horizontal rotation

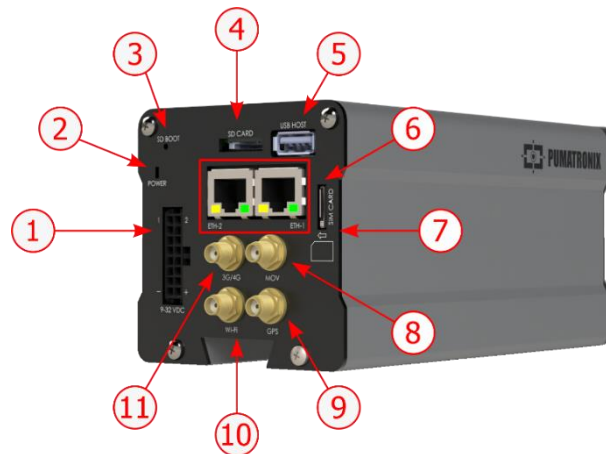- Interfaces: connectors available for access on the ITSCAM 600 device back panel

Figure 10 - Interfaces of an ITSCAM 600 device (there may be variations depending on the ITSCAM FF 600 model)

	Interface	Mechanical Specification
1	Microfit	Power, IOs, RS-232, RS-485 connector
2	POWER	Status LED
3	SD BOOT	Reset Switch
4	SD CARD	for microSD 2.0 card
5	USB HOST	2.0 (host)
6	ETH-1 e ETH-2	RJ-45 connector (EIA/TIA-568A standard indicated)
7	SIM CARD	connector for nano SIM (12,3 x 8,8 x 0,67mm)
8	MOV Antenna	male SMA connector
9	GPS Antenna *	
10	Wi-Fi Antenna *	
11	3G/4G Antenna *	

*Only available on ITSCAM FF 600 LM AD IOT (CP1I5) and ITSCAM FF 600 FHD LM AD IOT (CP1I4) models.

- Maximum operating temperature (inside the case): -10° to 65° C (with relative humidity of 5 to 95% and non-condensing)
- Weight: 2.75 Kg *

*When connecting ITSLUX illuminators, the equipment set total weight can reach 3.11 Kg, depending on the model used. ITSLUX illuminator mechanical specifications can be accessed in the product manual.

- Dimensions:

Front View	Side View

	A) Height	B) Width	C) Length
Dimensions in millimeters	241	148	485
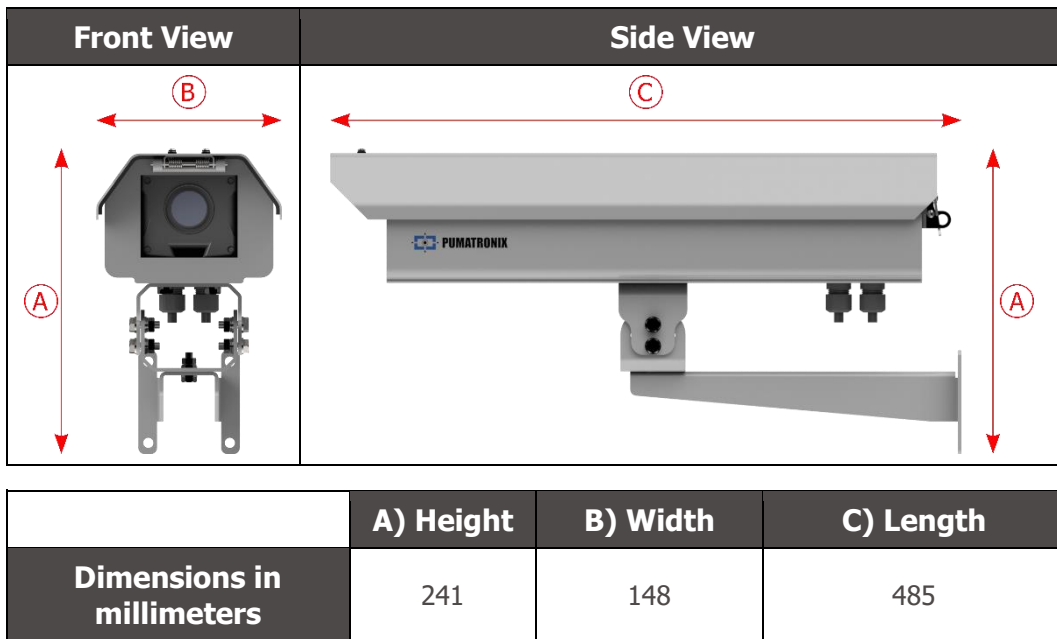
5. Electrical Specifications

- Power: 90 VAC~264 VAC (mandatory grounding at installation site)
- Maximum input current: 1.5 A
- Minimum and maximum consumption:
  - Models *ITSCAM FF 600 LM AD IOT (CP1I5)* and *ITSCAM FF 600 FHD LM AD IOT (CP1I4)*: 8.5~10 W
  - Models *ITSCAM FF 600 LM AD* and *ITSCAM FF 600 FHD LM AD*: 7.5~9 W
- Typical power: 24 W in maximum steady state
- Maximum power: 63 W only at equipment start-up
- Surge protection: IEC 61000-4-5 2 KV
- Protection against electrostatic discharge (DC supply): ±30 kV by contact - Level B (IEC 61000-4-2/AEC Q100-002) and ±30 kV by air (IEC 61000-4-2/AEC Q100-002)
- Fast electrical transient (EFT) protection (DC supply): direct current peak at 10/1000 µs up to 53.3 A ±5% (ISO 7637 and IEC 61000-4-4)
- Inrush current protection: 8 A in 2 seconds (IEC 63129:2020)

Connection Board Interface	Electrical Specifications
4 digital inputs/outputs (IOs)	with bidirectional 3.75 kV insulation programmed by the user (maximum current 50 mA, maximum voltage 28 Vdc and impedance of 10 kΩ)
RS-485/422 Serial Port	Half Duplex port with electrostatic discharge protection of ±8 kV by contact (IEC 61000-4-2) and ±15 kV by air (IEC 61000-4-2)
RS-232 EIA/TIA Serial Port	Port with a maximum transmission rate of 115,200 kbps and protection against electrostatic discharge of ±8 kV by contact (IEC 61000-4-2) and ±15 kV by air (IEC 61000-4-2)

ITSCAM 600 device's Interface	Electrical Specifications
2 Gigabit Ethernet ports	5 kVAC dielectric insulation, ±30 kV electrostatic discharge protection by contact - Level B (IEC 61000-4-2) and ±30 kV by air (IEC 61000-4-2), EFT for peak direct current at 5/50 ns up to 40 A ± 5% (IEC 61000-4-4) and 4 A surge current protection (tP = 8/20 μs) (IEC 61000-4-5)
Outdoor Storage	protection against electrostatic discharge of ±8 kV by contact (IEC 61000-4-2) and ±15 kV by air (IEC 61000-4-2);
USB 2.0 port (host)	protection against electrostatic discharge of ±8 kV by contact (IEC 61000-4-2) and ±15 kV by air (IEC 61000-4-2).
Wi-Fi*	protection against electrostatic discharge ±8 kV by contact (IEC 61000-4-2) and ±15 kV by air (IEC 61000-4-2) and the external high gain antenna (2.45 GHz ISM, U-NII, Wi-Fi, WLAN Whip, 2.4~2.5 GHz 2.8 dBi
4G and 3G*	electrostatic discharge protection ±8 kV by contact (IEC 61000-4-2) and ±15 kV by air (IEC 61000-4-2) and high gain straight external antennas (850 MHz, 900 MHz, 1.8 GHz, 1.9 GHz, 2.1 GHz CDMA, DCS, EDGE, GPRS, GSM, HSPA, PCS, UMTS, WCDMA, 824~960 MHz, 1.71~2.17 GHz 1.42 dBi, 1.91 dBi, 2.51 dBi, 3.23 dBi, 2.89 dBi) (Certificates: GCF, FCC, ANATEL, NCC, RCM, CE);
GPS*	Qualcomm® IZat ™ Gen8C Lite Multi-constellation Glonass, BeiDou/Compass, Galileo and QZSS, with external active antenna 1.57~1.58 GHz 2 dBic

*Available in *ITSCAM FF 600 LM AD IOT (CP1I5)* and *ITSCAM FF 600 FHD LM AD IOT (CP1I4)* models.

Interface	Connectivity Specifications
Outdoor Storage	supported microSD 2.0 card up to 128GB
Wi-Fi*	iEEE 802.11 standard 2.4 GHz b/g/n bands, with 46 Mbps UDP throughput and 28 Mbps TCP/IP
4G and 3G*	LTE-FDD/LTE-TDD/WCDMA/GSM technologies in the bands: LTE FDD: B1/B2/B3/B4/B5/B7/B8/B28; LTE-TDD: B40; WCDMA: B1/B2/B5/B8; GSM/EDGE: Quad-band
2 Gigabit Ethernet ports	10/100/1000 tri-speed
IoT M2M*	Supported with 150 Mbps downlink and 50 Mbps uplink rate

*Available in *ITSCAM FF 600 LM AD IOT (CP1I5)* and *ITSCAM FF 600 FHD LM AD IOT (CP1I4)* models.

Component	Image Processing Specifications
CPU	Quad-core arm™ A53 (1.2 GHz)
RAM Memory	16 Gb LPDDR4 (2100 Mbps and 1050 MHz)
2 MP Image sensor	2 MP (1636x1220 px) Global Shutter with proprietary HDR technology and Day/Night mode (generates color images during the day and monochrome images at night) Physical sensor size: 1/1.18" Internal frame rate: 15 fps Minimum shutter of 1/12500 (80 μs) and maximum of 1/15.6 (64ms, 64000 μs)

Component	Image Processing Specifications
2.3 MP Image sensor	2.3 MP Global Shutter (1920x1200 px), with Day/Night mode (generates color images during the day and monochrome images at night) Physical sensor size: 1/2.6" Internal frame rate: 30 fps Shutter minimum of 48 μs and maximum of 30000 μs (or 30 ms)
SD Card Storage	32GB
Watchdog	on hardware with a period of 50 seconds

The ITSCAM FF 600 FHD LM AD IOT (CP1I4) and ITSCAM FF 600 LM AD IOT (CP1I5) models contains the boards EC25-AUFA-512-STD and ATWILC3000-MR110UA, approval code Anatel 06239-18-07968/0142417-03464.

Oxidation Risk: The electrical and signal connections, made in the ITSCAM FF 600 bundle and in the data network cable, must be protected in a terminal box or similar structure to avoid the unwanted infiltration of liquids in the bundle and the consequent ITSCAM FF 600 connections oxidation.

Power Connections

Electrical and signal connections are made to the ITSCAM FF 600 Connection Board, and some data connections are available on the ITSCAM 600 device back panel as specified in Mechanical Specifications. Access the Installation and Maintenance Guide for more information and possible connections illustrations.
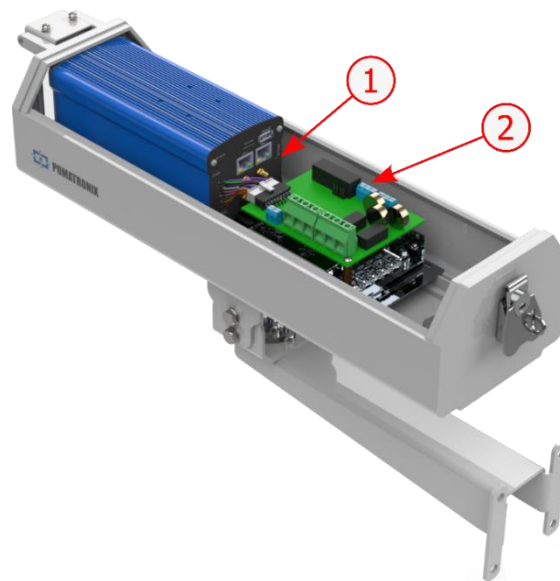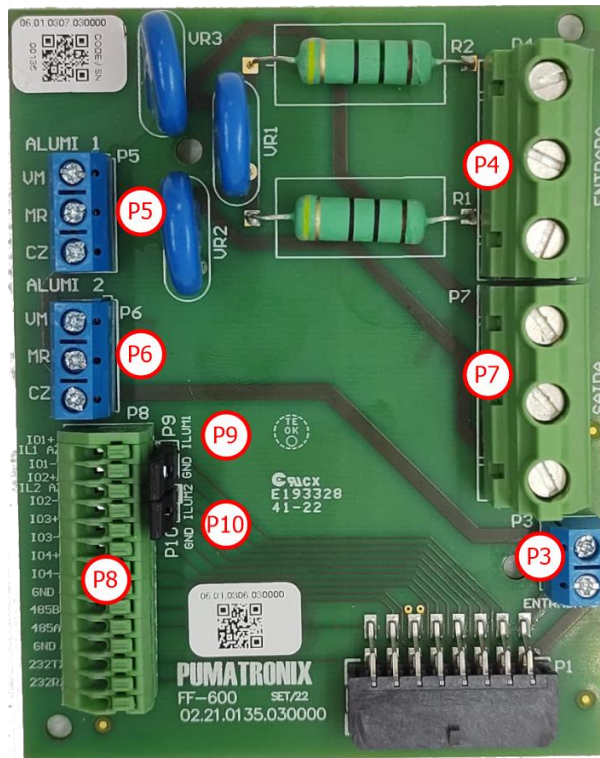

Figure 11 - Available connection interfaces: 1) ITSCAM 600 device connectors; 2) Connection Board Connectors

- Connectors available on the *Connection Board*:

Connector	Interfaces	Color	Description	Use
P4	**N**	Red or Light Blue *	Neutral	AC power input
	TERRA	Yellow + Green*	Ground	
	L	Red*	Phase	
P7	**N**	White	Neutral	DC Power supply
	GND	Green	Ground	
	L	Blue	Phase	
P3	**DC-**	Brown	24V	PCI power supply
	DC+	Red		
P5	**VM**	Red	Power Supply	Illuminator 1 power supply
	MR	Brown	IN+	
	CZ	Gray	GND	
P6	**VM**	Red	Power Supply	Illuminator 2 power supply
	MR	Brown	IN+	
	CZ	Gray	GND	

Connector	Interfaces	Color	Description	Use
P8	IO1+	Blue	Illuminator 1	Connection of input and/or output configurable signals
	IO1-	-	Connect Jumper 9	
	IO2+	Blue	Illuminator 2	
	IO2-	-	Connect Jumper 10	
	IO3+	-	IOs	
	IO3-	-		
	IO4+	-		
	IO4-	-		
	485 GND	-	RS-485	RS-485 protocol connection
	485 B	-		
	485 A	-		
	232 GND	-	RS-232	RS-232 protocol connection
	232 TX	-		
	232 RX	-		
P9	GND /ILUM1	-	Illuminator 1	Connect jumper when using Pumatronix illuminators
P10	GND /ILUM2	-	Illuminator 2	

*Colors as indicated in NBR 5410, and user can make available in the installation 110 VAC or 220 VAC.

Trigger in IOs

ITSCAM FF 600 has 4 connections on the Connection Board that can be used as inputs or outputs (IOs), IO1 and IO2 are dedicated to the illuminator drive control and IO3 and IO4 are available for installing external sensors, such as loops and light barriers, which identify the moment of capturing the images (trigger).

The configuration process is done by software, using the ITSCAM 600 device web interface or the communication protocol. ITSCAM FF 600 ports set as Input can be sensitized by: *Rising Edge*, *Falling Edge*, *High Level* and *Low Level*.

⚠️ **IOs Specification: Maximum supported current of 50 mA and maximum supported voltage of 28 VDC. The circuit rated drive current is 10 mA.**

Illuminator Connection

In low light situations at the ITSCAM FF 600 installation spot, it is possible to apply up to two illuminators, connected to the *Connection Board*. Applying illuminators is optional and requires maintaining a minimum distance of 50 centimeters from the image capture device.
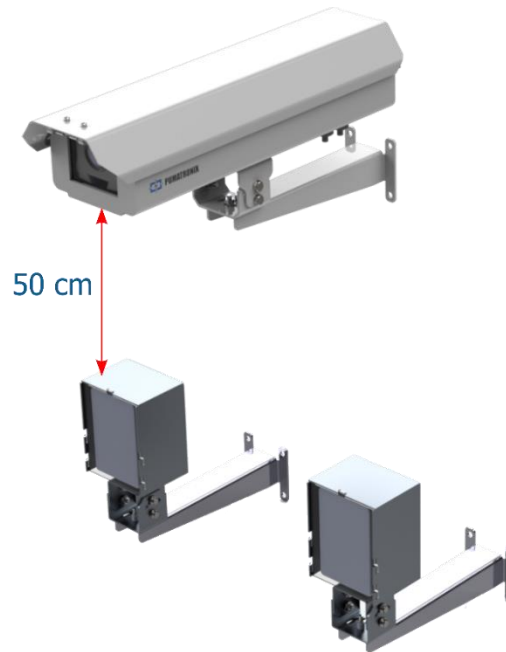
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Figure 12 - Example of 2 illuminators installation considering the minimum distance to ITSCAM FF 600

⚠️ **IP Protection: To prevent liquids inflow, the unused cable gland must remain cordless, closed and with the rubberized protector simulating the installation wire.**

⚠️ **Illuminator Installation: When using an illuminator in conjunction with the ITSCAM FF 600 device, check the product specifications for the minimum and maximum distance that must be observed in relation to the position of the object to be illuminated.**

Ethernet Connection

ITSCAM FF 600 enables communication with other devices using the TCP/IP protocol. For such connection, the equipment provides two Gigabit Ethernet ports (RJ-45 connector) on the back of ITSCAM 600 device. It is indicated to use the EIA/TIA-568A standard on the connections.
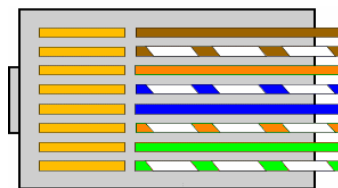

Figure 13 - RJ-45 connector standard EIA/TIA-568ª

⚠️ **ETH2 Ethernet network interface: The ITSCAM FF 600 second network interface is disabled in the standard equipment setup.**

Antenna Connection

The images captured by ITSCAM FF 600 may present the geolocation, made available by the GPS integrated with the equipment. The Wi-Fi, 4G and 3G signals can also be amplified using external antenna, with SMA type connector (male connector, i.e., with center pin).

Connectors for Wi-Fi, 4G/3G antennas signals are available in the models *ITSCAM FF 600 LM AD IOT (CP1I5)* and *ITSCAM FF 600 FHD LM AD IOT (CP1I4)*, on the back panel of ITSCAM 600 device. The screen printing on the equipment back panel assists in identifying connectors for the antennas:

Figure 14 - SMA connectors for the antennas (there may be variations depending on the model*)

1	Wi-Fi Antenna	**3**	MOV Antenna
2	GPS Antenna	**4**	4G/3G Antenna

*The models indicated have antennas for connection. In non-standard installation locations where the antenna is not effective in the application, contact Pumatronix support.

⚠️ **Specification of 4G and 3G Technologies: Consult Pumatronix Technical Support for use of ITSCAM 600 in other countries.**

6. Software Specifications

The data generated by ITSCAM FF 600 is stored and made available through a plugin installed on ITSCAM 600 device. The plugin used by default for ITSCAM FF 600 is ITSCAMPRO Móvel.

Access to ITSCAM 600

The ITSCAM 600 device can be accessed via web interface for evaluating the images generated and performing configurations such as Network, OCR and Trigger, for example. For accessing the network, it is required to inform:

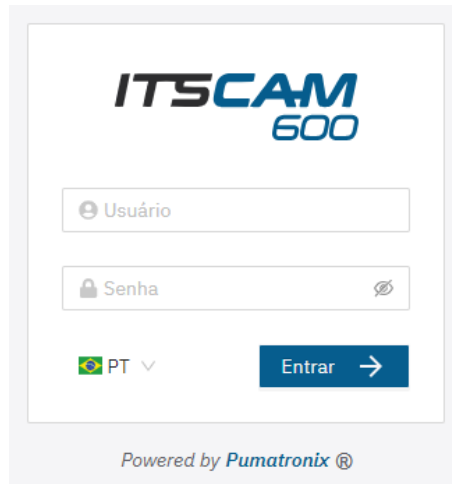| **User**	admin
Password	*1234*

Figure 15 - ITSCAM 600 device access screen

Multiple Users

ITSCAM FF 600 allows greater control of access and changes to the equipment, because by creating multiple users with remote and simultaneous access, the activity of each one can be tracked in the system logs. Users have an *Administrator* or *Operator* access profile, with the characteristic permissions of each profile, detailed in the ITSCAM 600 device Integration Manual.

ITSCAMPRO Móvel Plugin Access

The ITSCAMPRO Móvel plugin is installed on ITSCAM FF 600 in the factory process and allows access to the extracted data in the image captures, as a *Registers Report*. Access can be made through port 9080 by default, indicating the default address of access to plugin 192.168.0.254:9080 and informing the requested data:

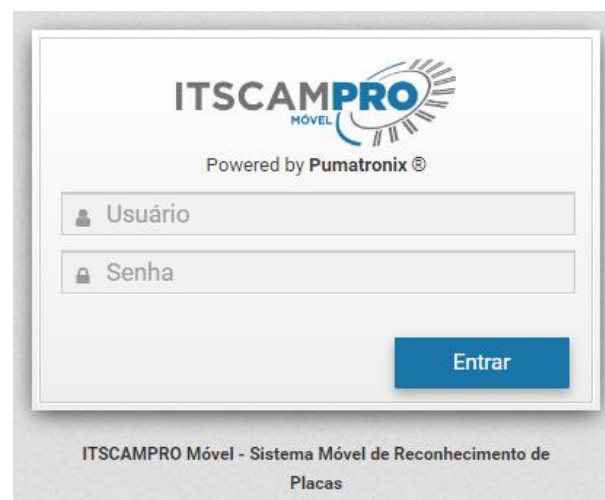| User	*admin*
Password	*admin*

Figure 16 - ITSCAMPRO Móvel software access screen

Image Capture Architecture

To meet the applications of Intelligent Transport Systems (ITS), ITSCAM FF 600 has several functionalities associated with image acquisition. These features make up a general architecture and can be disabled accessing the device setup *Profile*. The image acquisition process begins with the image request (*trigger*). This request can be made through external sensors, connected to one or more ports of ITSCAM FF 600 (IOs set as Inputs). In the ports setups it can be informed that the capture trigger will be made by edge (up, down or both) or level (high and low).

There is an alternative to using external sensors connected to the ITSCAM FF 600 *Connection Board*, which is setting up the trigger for capturing an image by software drive. In this case, the activation can be in a *Constant* interval of time or when the equipment identifies movement in the image (trigger by motion), enabling the *Motion Detector* functionality.

After defining the ITSCAM FF 600 image capture flow, the *Multiple Exposures* functionality can be enabled per request. This technology allows setting up two to eight sequential images, with variation in the capture parameters at each request.

Identifying the license plate of the vehicles present in the image can be done by enabling the OCR processing available for plate character recognition available for several countries. To increase the reading accuracy, the *Majority Voting* can be enabled.

The functionality that promotes a more complete recognition of the vehicles in the images is the *Classifier*, responsible for identifying the type of vehicle detected in the image, in addition to the characteristics of the brand, model and color.

Motion Detector

The definition of movement between two ITSCAM FF 600 consecutive images depends on the set variation parameter, that considers for the *Motion Detector* a time interval between the shots (triggers) and a *Threshold* of variation required to be activated. Additionally allows to specify a *Region of Interest* in which is delimited in which portion of the image the movement will be evaluated, which corresponds to a polygon with four vertices, which is drawn over the image visualization.

Classifier

ITSCAM FF 600 can analyze the captured images in real time and evaluate the images content. This analysis aims to distinguish motorcycles, cars, trucks, and buses from images that display only the track. This *Classifier* analysis has a degree of certainty in the classification, considering image samples that were used to generate this analytical. It is important to inform the correct type of installation, as ITSCAM FF 600 can be used to capture two or three track lanes simultaneously, depending on the model applied. From two track lanes, the *Panoramic* scenario must be chosen.

The *Classifier*'s *Enable object tracking* option allows to define regions that operate the *Virtual Loop* (*Virtual Trigger Regions*), by configuring the direction in which vehicles travel in each lane of the road, with capacity for up to four loops.

When enabling *Reading of Vehicle Characteristics*, the *Classifier* processes the reading of vehicle characteristics such as brand, model and color, in addition to other enabled options, which can increase processing time.

Multiple Exposures

The ITSCAM FF 600 *Multiple Exposures* functionality generates two to eight sequential images per request, by configuring the Number of captures per pulse via interface. This feature can increase the accuracy rate in the automatic identification of plates and identify vehicles that had some kind of concealment when the first image is captured. The settings that may vary are:

- The Flash intensity, always corresponding to a percentage of the initial trigger. This option is available for the line of ITSLUX illuminators from Pumatronix, designed to deliver the best results with *Multiple Exposures*;
- The image sensor exposure time (*shutter*), generating images varying the amount of light captured;
- Digital post-processing (*Gain*), which allows the images to lighten or darken.

Therefore, the varied Gain, Shutter and Flash adjustments in each of the exposures allow, for example, that in the first capture allows the non-reflective plates to be clearly visualized and in the second capture, adjusting weak flash, which allows the reflective plates show a better visualization, by preventing them from becoming saturated in the image.

OCR

ITSCAM FF 600 can recognize license plates from Brazil (in the Brazilian and Mercosur standards), Argentina, Chile, Mexico, Paraguay, Uruguay, and the entire Southern Cone simultaneously. When enabled, recognition is done on all captured images. Depending on the vehicles flow and the processing required from the ITSCAM 600, the number of *Processing Threads* can be changed. It is important to set a *Recognition Timeout* to discard images where the plate could not be read. The effort spent on plate identification can be set in *Processing Mode*.

OCR allows to define a ROI (Region of Interest) in the image in order to reduce the processing of image regions where there is no plate to find. Access ITSCAM 600 Integration Manual for all available OCR settings.

Majority Vote

Majority Vote is a feature applied to the results of the automatic reading step of characters on vehicle plates (OCR) and/or to the *Classifier*. This analytic defines which string best describes the vehicle plate captured in the image. The algorithm compares the identification *Reliability* of each character, based on the character image in perfect reading conditions. This analysis can be done only on the *Multiple Exposures* image set or using sequential images. Simply configure the parameters of the *Maximum different characters* and *Same-plate recognition debounce*. During the passage of the vehicle through the region monitored by the ITSCAM FF 600, several images of the same vehicle can be captured for processing. However, you can enable the option to *Send only the exposition with best recognition* and the other images will be discarded.
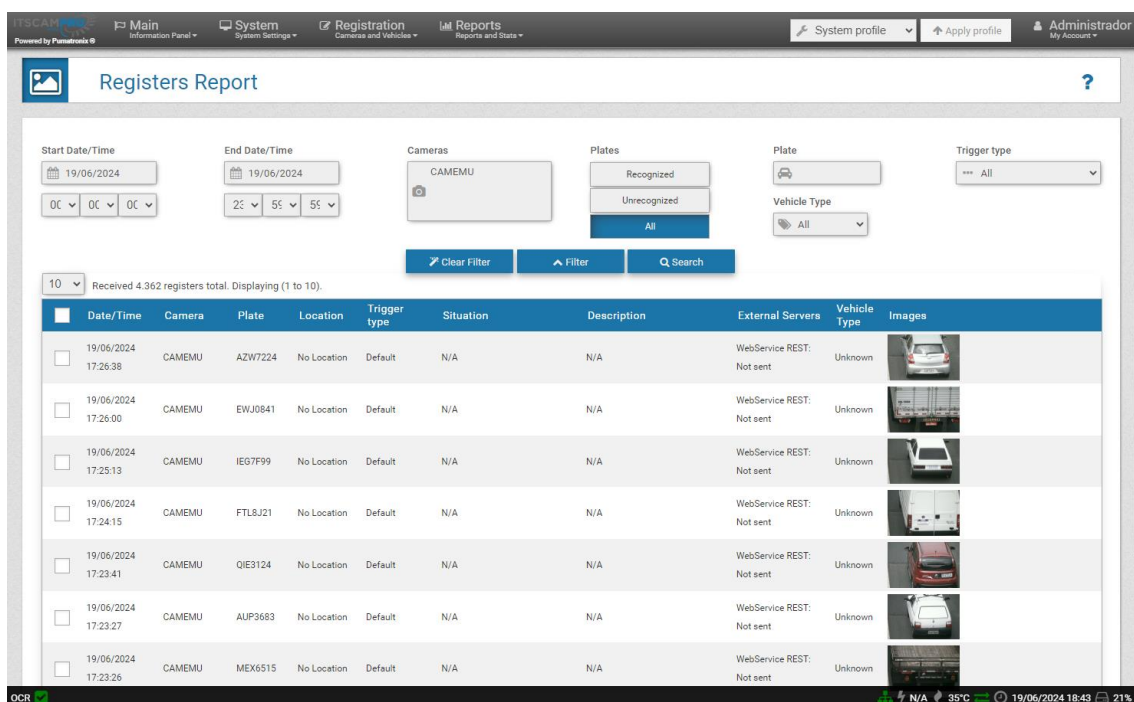
Automatic Profile Transitioning

ITSCAM FF 600 allows to register up to four sets of equipment settings, called *Profiles*. These settings correspond to image adjustments, framing (zoom and focus) and the transition conditions between the registered profiles. Changing between profiles is automatic when an image *Level* time and value are reached for optimal image quality in any lighting situation. It is recommended to use one profile for captures with ambient light (daytime) and another for captures with artificial lighting (nighttime). See the Integration Manual and Product Manual for technical information on these technologies.

Data Security

Digital Signature and Data *Encryption* are the information security mechanisms generated by the ITSCAM 600 family of devices. The *Digital Signature* technology allows the information received by the end user to be validated and in case of an attempt to change or manipulate the data, it will be promptly identified. Data *Encryption* ensures that only authorized recipients have access to the images, preventing unauthorized individuals from intercepting or viewing the information. Refer to the ITSCAM 600 Integration Manual and Product Manual for technical information on these technologies.

Registers Report

When accessing the ITSCAMPRO Móvel software interface, in the menu *Report > Registers Report* it is possible to retrieve data from the stored registers, using filter options. The results are presented as a report, based on the application of filter criteria in the search, detailed in the software ITSCAMPRO Móvel manual.

Figure 17 - ITSCAMPRO Móvel Registers Report Screen

The *Actions* available for the records are: *Exporting selected records* (in CSV format); *Exporting selected records (with images)* in zip format or *Removing selected records*.

Detailed Register Information

When accessing the *Registers Report* images, the details of register are displayed in tabs and contain the data obtained in the capture:

- Sequence of captured images that can be enlarged or viewed in full screen or copied (by clicking on the download button next to them);
- Number of the log generated in ITSCAMPRO Móvel;
- Vehicle license plate read automatically. If the user has permission to change the plate, an edit button is displayed next to it;
- Temporal information of image acquisition (capture date and time);

- Location data (equipment identification and geolocation, when the map is enabled);
- Option to delete the register, if the user has permission;
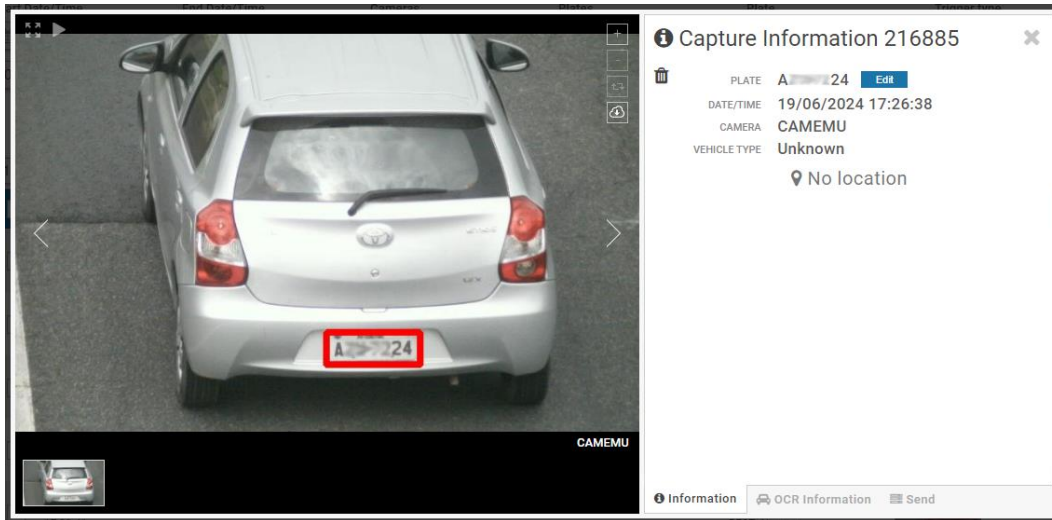- Vehicle details (category).

Figure 18 – Register Information screen initial tab

Information about the OCR processed for registration can be obtained from the OCR tab and refer to:

- the time spent in the recognition process;
- the color of the background shown on the plate;
- the type of plate, which may be motorcycle or not;
- the plate's country of origin;
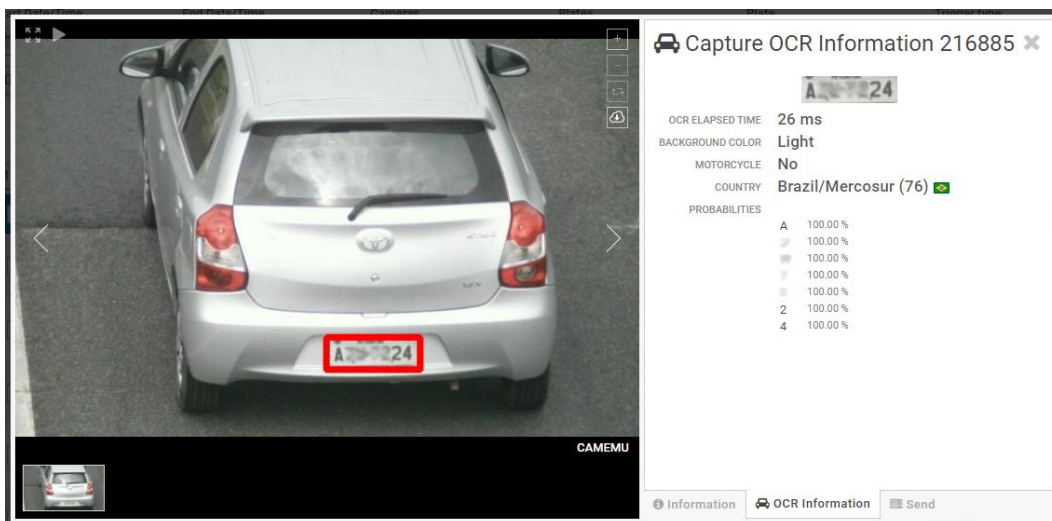- the OCR probability of success for each identified character.

Figure 19 - Register Information screen OCR tab

In the *Send* tab, you can check the status of logs sent to each server enabled in the system:
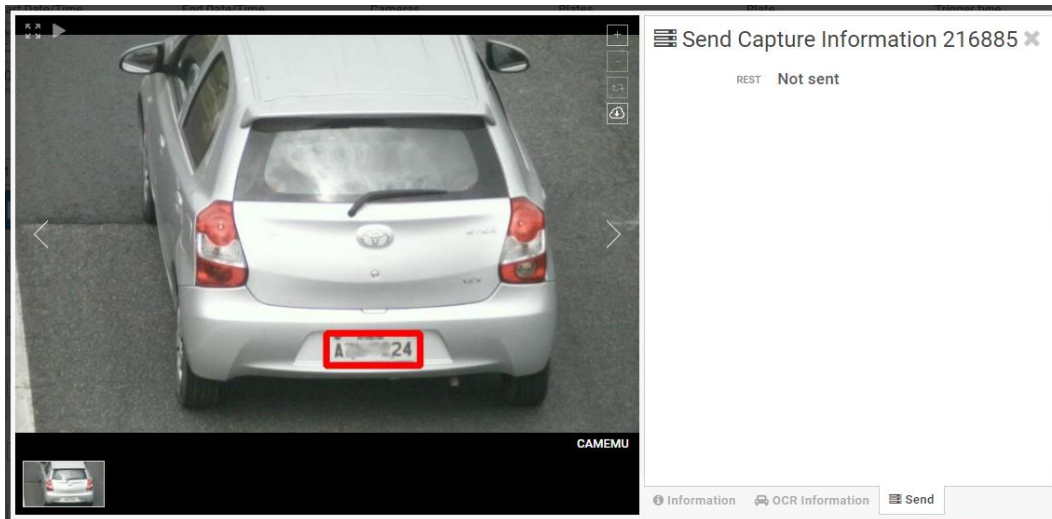
Figure 20 - Register Information screen Send tab

ITSCAM FF 600 can send the captured images to vehicle storage and monitoring centers as follow:

Server	Interaction with ITSCAM FF 600
FTP	The FTP server allows receiving the images captured by ITSCAM FF 600
ITSCAMPRO	The ITSCAMPRO type server is used to send images and plate read by the embedded OCR. ITSCAMPRO is an application that concentrates images and plates. Various types of reports can be viewed and generated (see Pumatronix for more information about the application)
Lince	The Lince server is Pumatronix's cloud SaaS platform, ideal for concentrating large numbers of devices and implementing electronic fencing by image
WebService REST	Integration of ITSCAMPRO Móvel with systems that use Web Service REST architecture.
PM-PR*	Integration of ITSCAMPRO Móvel with Paraná Military Police system
PM-MG*	Integration of ITSCAMPRO Móvel with Military Police of Minas Gerais PM-MG system
Detecta-SP*	Integration of ITSCAMPRO Móvel with Detecta-SP system
SPIA PRF*	Integration of ITSCAMPRO Móvel with PRF (Federal Highway Police) system

*Integration with PM-PR, PM-MG, Detecta-SP and SPIA-PRF systems depends on license release in ITSCAM FF 600.

7. Licensing

The ITSCAM FF 600 license includes the image capture and processing device hardware, with automatic and embedded recognition of images' vehicles license plate (via OCR) in the old Brazilian and Mercosur standards, besides the functionalities presented in this manual. For releasing recognition of additional country plates, please contact Pumatronix Commercial. New features and bug fixes are available in new firmware versions, provided by Pumatronix Technical Support.

8. Initial Setup

Installation Prerequisites

The conditions at the monitoring location, prior to installation, are essential for the operation of the equipment.

Equipment Installation Spot

The ITSCAM FF 600 line can be installed in an urban and road environment, and it is possible to adjust the framing to capture up to three track lanes. When installing on the highway, the minimum height limits specified for the location must be respected, as well as the maximum equipment vertical inclination angle of 45°. Vertical inclination larger angles generate significant deformations in the images, which implies which implies a reduction in the automatic recognition rate of license plates detected in the images:
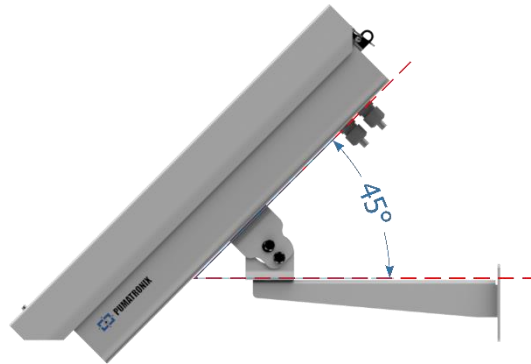

Figure 21 - Maximum angle of inclination of the ITSCAM FF 600 Protective Box

For installing ITSCAM FF 600, the linear distance between the equipment and the image center when positioning the equipment on the road must be considered. In night operations, this distance varies depending on the illuminator model applied. The installation diagram for capturing images of two lanes of the runway images indicates the ideal equipment position over the center of the track:

minimum d	4 meters
maximum d	45 meters
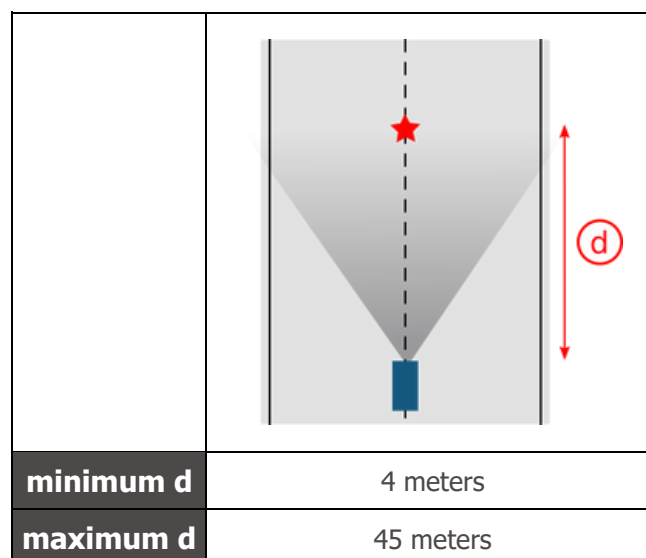
*Variable depending on the applied model, specified in Models.

⚠️ **ITSCAM FF 600 Installation Suggestion: The suggested information is based on the motorized lenses focal length of Pumatronix's ITSCAM FF 600 line and ITSLUX illuminators. You can install outside the recommended standard, but the vehicle plates automatic recognition indexes may be affected. In case of doubt or installation situation other than those presented, consult Pumatronix Technical Support.**

Pay attention to equipment positioning restrictions in vehicle circulation locations if ITSCAM FF 600 is installed on a side structure. When choosing this type of installation, the equipment must be at the nearest safe distance from the road. The equipment height must consider the maximum vertical angle of 45° and the possibility of concealment. This concealment of vehicles on the road, captured in the farthest lane, is done by large vehicles traveling in the closest lane.

At the equipment attaching place, there must be:

- Power feeding point according to Electrical Specifications, near the equipment installation point;
- Connectivity with data network near the equipment installation point (based on the chosen modality);
- Pole for attaching the equipment support;
- Availability of an *Auxiliary Setup Device* (for framing conferencing and image adjustments), with the Google Chrome browser (version 85 or higher) installed.

Conditions Required for Installation

To get ITSCAM FF 600 best performance, the installation of the equipment should be done with little horizontal inclination and avoiding the concealment of image parts by objects such as trees or vehicles from other tracks.

⚠️ **Installation Spot: In cases where it is not possible to meet the installation specifications, it is recommended to consult Pumatronix Technical Support.**

Network Interface Parameterization

ITSCAM FF 600 has two network interfaces: ETH1 and ETH2. In factory default configuration, the first network interface (ETH1) has the displayed setting, and the second network interface (ETH2) is disabled:

Eth1 Port Setting	Default Value
IP Address	192.168.0.254
Maintenance IP Address	192.168.254.254
Netmask	255.255.255.0

⚠️ **ITSCAM FF 600 connectivity: Check in the Wi-fi Network Configuration how to configure the Wi-Fi, 4G and 3G network interfaces, since they are disabled in the equipment's factory settings standard.**

In situations where ITSCAM FF 600 network setting is distinct from the standard, it is indicated to change the settings before installing the equipment in the place. The changed network setting is saved in a flash memory; however, it is effectively applied after restarting the equipment. When the change is made by the Web interface, the restart is automatic, after confirming the change.

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ITSCAM FF 600 has a recovery IP address (192.168.254.254), for cases where the user mistakenly changes the IP address and loses connection to the device. Access to this recovery IP address is only available in a peer-to-peer connection with the equipment when connected to the ETH1 port.

⚠️ **The ITSCAM FF 600 (192.168.254.254) maintenance IP address is used to recover connection in extraordinary situations of loss of primary IP. For this reason, when manually configuring the equipment's network interface (Ethernet or Wi-fi), it must be applied values that differ from maintenance IP.**

The most common conflict situations between the primary IP address and the maintenance one are:

- ITSCAM FF 600 primary IP in 192.168.254.x range and 255.255.255.0 netmask;
- ITSCAM FF 600 primary IP in 192.168.x.x range and 255.255.0.0 netmask;
- ITSCAM FF 600 primary IP in 192.x.x.x range and 255.0.0.0 netmask;
- Netmask set to 0.0.0.0.

Wi-Fi Network Configuration

⚠️ **ITSCAM FF 600 connectivity: Wi-Fi, 4G and 3G network interfaces are disabled in the standard equipment factory settings.**

1) Access the device's web interface with data recorded in the parameterization of network interface;
2) Access the *Equipment > Network* menu on the *Wi-Fi* tab;
3) Select the *Station (STA)* Operating Mode to connect to an existing Wi-Fi network;
4) Click in the *SSID* field and the nearby Wi-Fi networks available for connection are listed for selection;
5) Select the *Authentication* Protocol to use: *Open (no authentication)*, *WEP* or *WPA/WPA2 PSK*;
6) Enter the password for access to the selected Wi-Fi network;
7) Click the *Apply* button at the top of the page when validating the entered data.

Select *Access Point (AP)* Operating Mode only when you want the device to be used as an access point to an available Wi-Fi network:

1) Enter the Identification Data (*SSID*), *Country*, *Channel*, and *Authentication* Protocol that will be applied to the distribution of the Wi-Fi connection;
2) Enter the *IP Address* and *Subnet Mask* for the DHCP Server by determining the address range for the appliances that connect to the Access point.

⚠️ **Use an IP address for the DHCP server that is different from the one applied to access the ITSCAM FF 600 device for the purpose of avoiding conflicts and malfunction of the data network.**

3G or 4G Cellular Configuration

Some mobile Internet operators require manual configuration of network data:

1) access the device's web interface with the data recorded in the parameterization of the network interface;
2) Access the *Equipment > Network* menu on the *Mobile* tab;
3) Click *Enabled* and the configuration fields are visible;

1) Enter the customized data whenever you need to configure the operator information. By default the information is:
   a. APN: http://[operator name].com.br;
   b. User: [operator name];
   c. Password: [operator name];
2) Click *Apply* to save the network settings.

9. First Access to ITSCAM 600 Device

The web interface of ITSCAM 600 device can be used to quickly check the equipment status and the location being captured in the images. However, the equipment must be energized, following the Electrical Specifications. An *Auxiliary Setup Equipment* (for framing conferencing and image adjustments) must be used with the Google Chrome browser (version 85 or higher) installed.

In addition, the *Auxiliary Setup Equipment* must be on the same data network as ITSCAM FF 600 (with a network configuration compatible with that of the ITSCAM FF 600). If a point-to-point connection is used, ITSCAM FF 600 can be accessed through the maintenance IP address *192.168.254.254*. When typing the ITSCAM FF 600 IP address in the browser address bar of the *Auxiliary Setup Equipment*, you must inform:
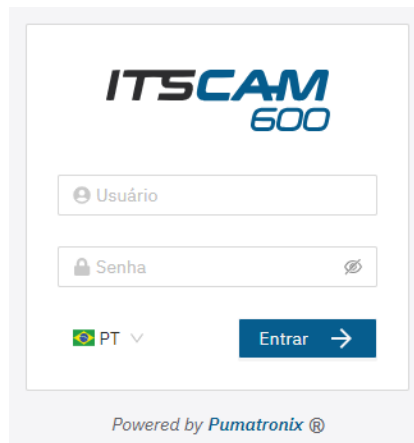
User	admin
Password	*1234*

Figure 22 - Tela de acesso ao dispositivo ITSCAM 600

10. First Access to the ITSCAMPRO Móvel Plugin

The ITSCAMPRO Móvel plugin web interface is used to extract the data captured by ITSCAM FF 600. Must be accessed from an *Auxiliary Setup Equipment*, connected to the same data network as the ITSCAM FF 600 device, by the address for external access or by devices that have the Android/iOS application installed.

The default address for accessing the plugin is 192.168.0.254:9080. If a point-to-point connection is used, ITSCAM FF 600 can be accessed by the maintenance IP address *192.168.254.254:9080*, through ETH1.

Use the Google Chrome browser (version 85 or higher) to access the system, typing the IP address provided in the navigation bar and then the user credentials. However, in the first access, it is indicated to create

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other users and restrict the *administrator* account use. To access for the first time, use the default factory data on the login screen:

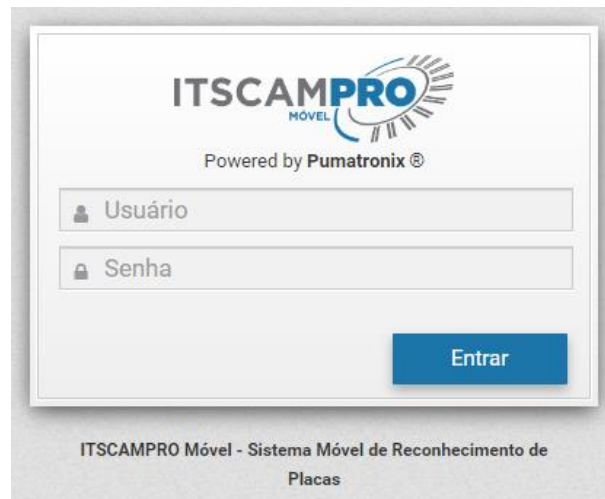| User	***admin***
Password	*admin*

Figure 23 - ITSCAMPRO Móvel software login screen

11. Care and Maintenance

Some steps are necessary to ensure the product performance and extend its shelf life.

> ⚠️ **Product Risks: There are some risks from using the product, these are presented in the Handling Risks section.**
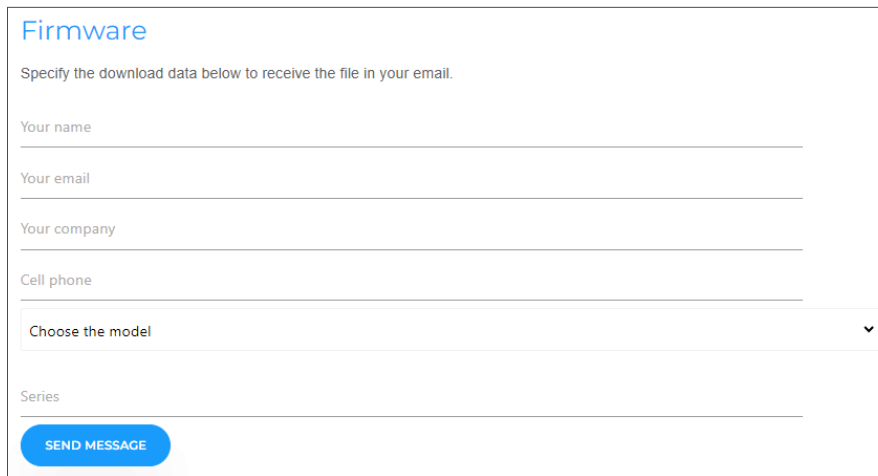
Firmware Upgrading

Pumatronix periodically* provides an update to ITSCAM FF 600 with defect corrections and functionality inclusions, please contact Technical Support on the Pumatronix website. The equipment upgrade process requires an *Auxiliary Setup Equipment* to connect to the equipment and can be done directly through its web interface using one of the installed web browsers:

- Microsoft Edge 109 or higher;
- Google Chrome version 85 or higher;
- Firefox version 21 or higher;
- Opera 25 or higher;
- Safari 8 or higher.

Updating the ITSCAM FF 600 firmware requires some security measures during the procedure to prevent the file from getting corrupted and the ITSCAM FF 600 device from not working:

1) Keep the ITSCAM FF 600 device inactive during the upgrade process, ensuring that it is not requested by any service or other equipment on the network in which it is installed;
2) Keep the ITSCAM FF 600 device always on during the update, taking the necessary measures to prevent it from being restarted or disconnected;

Request the firmware file by filling out the form provided in the Technical Support menu on the Pumatronix website:


Figure 24 - Online Firmware Request Form

If you have any questions, please contact Technical Support at suporte@pumatronix.com or WhatsApp +55 (41) 9203-8327.

*Pumatronix will provide versions with bug fixes or security improvements for up to 3 years after the product is discontinued and removed from the portfolio.

ITSCAM FF 600 Firmware Update via Web Interface

1) Download the firmware file received by email (which starts with the name itscam600 and has the extension .swu) on the *Auxiliary Setup Equipment* that will be used to connect to the ITSCAM FF 600;
2) Connect the Auxiliary Setup Equipment to the same data network as ITSCAM FF 600;
3) Open the Auxiliary Setup Equipment browser;
4) Enter the ITSCAM FF 600 IP address (the default IP address is 192.168.0.254 and point-to-point connections can be made by the address 192.168.254.254);
5) Inform user and password;
6) Access the menu: *System > Updating* the ITSCAM FF 600 web interface
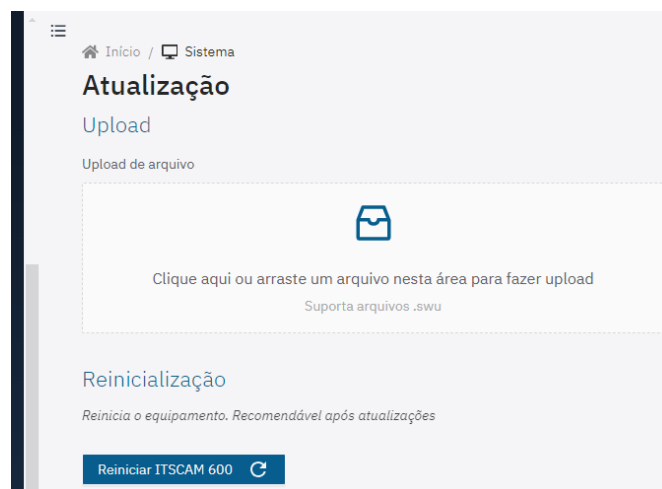
7) Select or drag the firmware file (the update starts automatically and occurs in three steps, which are signaled by the progress bar);

8) Keep track of the *Upload* reaching 100%, and following the *Installation*, making sure that the device is **not** restarted or turned off and that it is **not** being requested by any service or other equipment on the network during the process. This security is required when performing this procedure to prevent the update from corrupting the firmware and the equipment from crashing;

9) Check the *SWUPDATE successful!* message that indicates that the installation is complete.
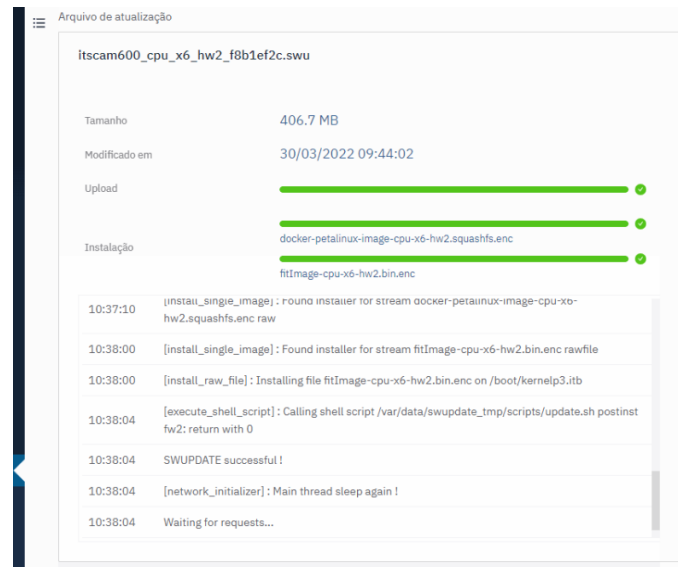
10) Click on the ITSCAM 600 Restart button;
11) Wait for the equipment to restart so that the new firmware changes are applied;
12) Finish the update procedure by checking the firmware version indicated in the page top bar.

(Restricted Procedure) Recovery of ITSCAM FF 600 by Factory Reset

⚠️ **Loss of Information: All files, images and settings stored in ITSCAM FF 600 are lost while performing the Recovery procedure.**

⚠️ **Restoration of the ITSCAMPRO Móvel plugin: Performing the ITSCAM FF 600 factory recovery process, causes the ITSCAMPRO Móvel plugin to stop. To restore the plugin's operation, it is necessary to trigger the support to release the plugin and update the licenses.**

The ITSCAM FF 600 recovery procedure requires an SD card with a minimum capacity of 4 GB and that can be formatted.

1) Download the ITSCAM FF 600 recovery file (file with .tar extension) (please contact Pumatronix Technical Support for access to the file);
2) Format the SD card using FAT32;
3) Unzip the recovery file on the formatted SD card;
4) Disconnect ITSCAM FF 600 from power;
5) Insert SD card into ITSCAM FF 600 (at ITSCAM 600 back panel);
6) Keeping the *RESET* button pressed, energize ITSCAM FF 600;
7) Release the *RESET* button once the status led turns green;
8) Verify the status LED blinking red, which indicates that the recovery process is undergoing;
9) Verify the status LED blinking green, which indicates the recovery is done;
10) Power off the board;
11) Remove the SD card from the card slot and power it on again.

ITSCAMPRO Móvel Plugin Update

ITSCAM FF 600 has integrated into the SD card the ITSCAMPRO Móvel software plugin, which provides the user with a user-friendly interface and simple operation. Upgrading to the latest version allows you to take advantage of updates and new features. The plugin update process occurs following the steps:

1) Download the firmware file received by email (which starts with the name *itscampromovel* and has the extension *.tar*) on the *Auxiliary Setup Equipment* that will be used to connect to the ITSCAM FF 600;
2) Connect the *Auxiliary Setup Equipment* to the same data network as ITSCAM FF 600;
3) Open the *Auxiliary Setup Equipment* browser;
4) Enter the ITSCAM FF 600 IP address (the default IP address is 192.168.0.254 and point-to-point connections can be made by the address 192.168.254.254);
5) Access the menu *System* > ITSCAM FF 600 Web Interface *Plugins*;
6) Select the *Stop* function for the current plugin at the page bottom;
7) Click *Remove* the current plugin;
8) Start the process of installing the plugin's new version by inserting the respective file in the area;

9) Create the redirect ports as described:
    a. - 80 (private) → 9080 (public);
    b. - 2000 → 2000;
    c. - 2005 → 2005;
    d. - 10000 → 10000;
10) Click on *Install;*
11) Please wait while the entire shipping and installation process is completed. Depending on the network situation, it may take up to 15 minutes for the entire process to be completed;
12) Force the initialization of the plugin by clicking on the *Start* button;
13) Check after this first startup that the plugin is automatically booted when accessing the ITSCAM 600 device system.

Update of Analytics Licenses

Licenses for the *Classifier* and *OCR* image analytics libraries can be updated directly through the web interface. When you receive the *.lic* file provided by Technical Support, access the *System > Licenses* menu in the interface and drag it to the indicated region:
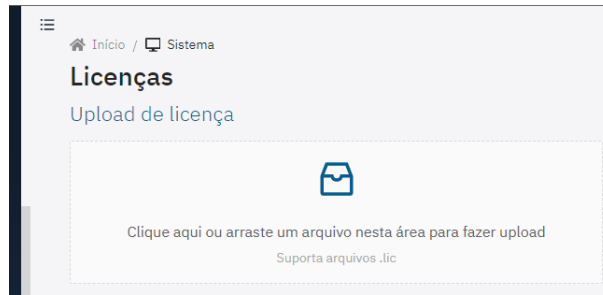
Figure 25 – ITSCAM 600 Web Interface at updating licenses

Preventative Maintenance

The ITSCAM FF 600 image capture and processing device shall provide images without artifacts. However, if the lenses or the protective box outer surface has any dirt, it must be cleaned;

1) Spray liquid for cleaning lenses on the surface of the lenses or water on the glass of the protective box, so that it is possible to remove excess dirt adhered to the surface:
2) Use a soft cloth that does not loosen fibers to remove dirt, moving the cloth in only one direction;
3) Wipe a dry cloth afterwards to finish cleaning and do not use force, as it is possible to damage the surface.

Figure 26 - ITSCAM FF 600 protection glass

12. Warranty General Conditions

Pumatronix guarantees the product against any defect in material or manufacturing process for a period of 1 year from the invoice issuance date, provided that, at the discretion of its authorized technicians, a defect is found under normal conditions of use.

The replacement of defective parts and execution of services resulting from this Warranty will only be provided in Pumatronix's Authorized Technical Assistance or a third party expressly indicated by it, where the product must be delivered for repair.

This Warranty will only be valid if the product is accompanied by a *Maintenance Form*, duly completed and without erasures, and an Invoice.

Situations where the Product Lose Warranty

1) Using software/hardware not compatible with the Manual's specifications;
2) Connecting the product to the power grid outside the standards established in the product manual and installations that present excessive voltage variation;
3) Liquids infiltration while opening/closing of the product;
4) Damage caused by natural agents (electric discharge, flood, sea air, excessive exposure to climatic variations, among other factors) or excessive exposure to heat (beyond the limits established in the Manual);
5) Using the product in environments subject to corrosive gases, excessive humidity and/or dust;
6) Showing signs of tampering with security seals;
7) Showing signs of opening and modification made by the Customer in points of the product not authorized by Pumatronix;
8) Damage caused by accidents/falls/vandalism;
9) Display tampered and/or removed serial number;
10) Damage resulting from the Customer transporting and packaging the product in conditions incompatible with it;
11) Misuse and use not compliant with the Instruction Manual.

Privacy Policy

In accordance with the Brazilian General Data Protection Law (LGPD) - Law No. 13.709, of August 14, 2018, this product has programmable functions for capturing and processing images that may infringe the LGPD when used, together with other equipment, to capture personal data.

The equipment does not collect, use or store personal information, whether sensitive or not, for its operation.

Pumatronix is not responsible for the captured images purposes, use and treatment, and the product's user or purchaser solely decides how to control the information and operate the product.

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