Video spectral comparator Regula 4307

The device is intended for advanced authenticity verification of passports, ID cards, travel documents, passport stamps, banknotes, driver's licenses, vehicle registration certificates and other vehicle related documents, signatures and handwritten records, paintings, revenue stamps and other security documents.

The device is made as a single unit for desktop use. It is used with a PC (model **Regula 4307MC.XXXX** is supplied with Built-in PC) and fully controlled through "Regula Forensic Studio" software interface (supplied with a unit). The video spectral comparator enables to capture, process and store digital images of examined objects. All models are equipped with a hyperspectral imaging module, modules for reading MRZ, RFID chips, hidden image (IPI), 1D and 2D barcodes. Regula 4307 is supplied with a Spectral luminescent magnifier **Regula 4147**, information reference systems "Passport", "Autodocs", "Currency" (Brief versions).

Regula 4307 has a set of light sources of visible, infrared, ultraviolet spectral ranges and imaging filters used for carrying out forensic examinations.

The comparator can optionally be equipped with a high resolution spectrometer, a light source for anti-Stokes luminescence, an XY translation stage, a built-in PC.

Features

- Connection interface — USB 3.0
- Protective shields against harmful UV radiation
- Big size/thick documents examination option
- Possibility to use with additional equipment (magnetic ink visualizer Regula 4197, spectral luminescent magnifier Regula 4177 and information reference systems on travel documents and banknotes

Functionality

- **Examinations under high magnification on different levels:**
  - **protection of the document basis**
    - paper opacity, watermarks, security fibers, planchettes, security threads, foil stamping, pole feature, all types of windows, transparent varnish coating, shadow images, etc.
  - **printing methods**
    - *intaglio*: texts, guilloche frames, rosettes and vignettes, microprinting, latent images and moire patterns, signs for the visually impaired, blind embossing, colour shifting ink, including OVI with embossing and latent images, etc.
    - *letterpress*: serial numbers, texts, barcodes, etc.
    - offset printing including Orlov and rainbow printing: texts, microprinting, moire patterns, background and anti-copy patterns, etc.
    - screen printing: security features with optically variable effects, etc.
    - see-through register
    - perforation
  - **physicochemical protection**
    - anti-Stokes luminescence
    - UV luminescence with different wavelength
    - IR luminescence
    - security features with magnetic properties, etc.
  - **complex security features**
    - holographic images, OVD
    - retroreflective protection
    - security features with IR-metameric ink
    - special polymer coating of security laminates
    - metallized coating
    - laser engraving
- **Additional examination of:**
  - fragments of document images depending on the degree of absorption or reflection of IR light
  - document alterations such as erasure, etching etc.
  - traces of signature forgery
  - extraneous lines (do not originally belong to the examined object) that are performed with IR opaque inks
  - blurred, crossed out entries, texts and images

    - document mechanical defects such as cuts, tears, folds, etc.
- Comparison of two images in different combinations (two saved images, saved image against live video, saved images against etalon image from information reference systems, etc.)
- Automatic reading of:
    - Textual information from machine readable zone of ICAO compliant documents (ID-1, ID-2, ID-3)
    - 1D and 2D barcodes
    - Information from RFID chips in eDocuments (DG1 to DG15, BAC, EAC, AA, PA, TA, PACE) and verification of those chips

Application

- Border control and immigration services
- Customs authorities
- Law-enforcement agencies
- Forensic laboratories
- Financial institutions
- Other agencies and organizations authorized to check documents
- Document examiners

Functionality		
Light sources	incident	ultraviolet 365 nm
		ultraviolet 313 nm
		ultraviolet 254 nm
		ultraviolet 395 nm*
		395 nm*
		450 nm*
		470 nm*
		505 nm*
		530 nm*
		590 nm*
		620 nm*
		640 nm*
		infrared 700 nm
		infrared 780 nm
		infrared 860 nm
		infrared 940 nm
		white
		All light sources are LEDs except ultraviolet 313, 254 nm * – separate LEDs, can be used in combinations (255 combinations)
		convertable infrared 800-1100 nm for Anti-Stokes (optional)
	transmitted	white
		infrared
		ultraviolet 365 nm
		spot white
		spot infrared
		All light sources are LEDs
	oblique	6×white
		6×infrared
		All light sources are LEDs
	coaxial polarized	white LED
	OVD	horizontal: 31 LEDs
		vertical: 9 LEDs
	back light	white LEDs

Camera filters:

- IR High pass 580 nm
- IR High pass 600 nm
- IR High pass 630 nm
- IR High pass 650 nm
- IR High pass 670 nm

- IR High pass 685 nm
- IR High pass 700 nm
- IR High pass 715 nm
- IR High pass 730 nm
- IR High pass 780 nm
- IR High pass 850 nm
- Visible pass 370-700 nm
- UV cut off 450-1100 nm
- Polarization

Video camera — 14 Mp, CMOS digital camera

Spectral response — 350-1100 nm

Frame size, pixels — 4416×3312

Magnification:

- optical — 30x
- digital — 10x

Fields of view:

- (204×153) ±14 mm (Full Frame)
- 270×200 mm (with X-Y Translation stage)

** – all magnifications are approximate*

Maximal document size (length×width), mm — 530×400

Output signal / Interface — USB 3.0

Spectral luminescent magnifier Regula 4147

Light sources:

- incident white
- 2 high-intensity infrared 980 nm: spot and flood

Field of view, mm — 12×9 (±1)

Sensor:

- type — CMOS
- megapixels — 3,1:
    - frame size, pixels — 2048×1536

Camera filters — IR low-pass with threshold, nm — 660

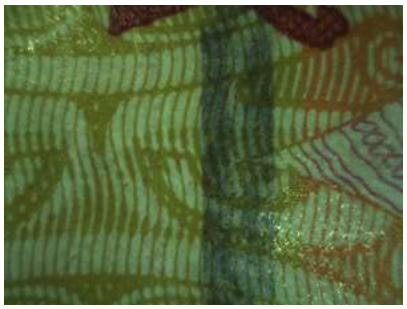
Connection interface — USB 2.0

Dimensions (length×width×height), mm, not more than — 94×62×52

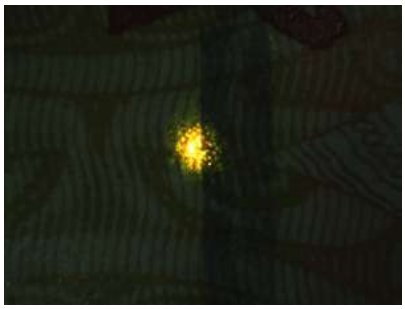
Weight, kg, not more than — 0,2

Power supply voltage, V — 5

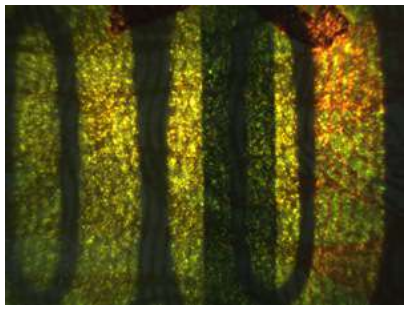
Power consumption, W, not more than — 12,5



Incident white



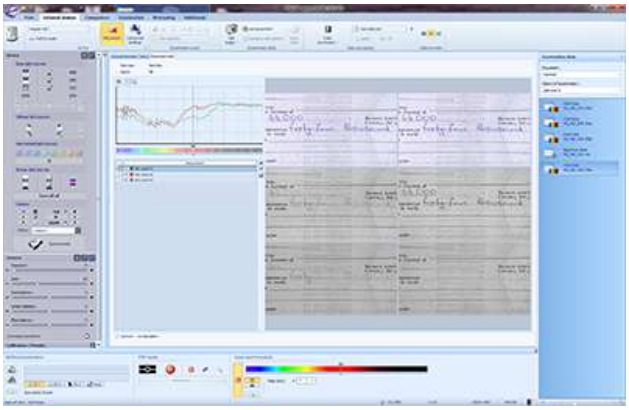
High-intensity infrared 980 nm: spot



High-intensity infrared 980 nm: flood

Hardware modules	Model				
	4307.1XXX	4307.11XX	4307.1X1X	4307.1XX1	4307MC.1XXX
Hyperspectral imaging module	+	+	+	+	+
High resolution spectrometer		+			
Light source for anti-Stokes luminescence			+		
XY translation stage				+	
Built-in PC					+

Hyperspectral imaging module – 400–1000 nm with a step of 1 nm



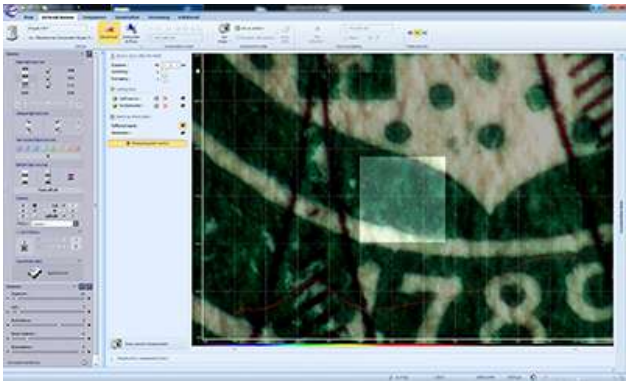
High resolution spectrometer (microspectrophotometer) for measurement of absorbtion, reflectance, transmission, and fluorescent features

Wavelength range: 350–1000 nm

Signal-to-noise ratio: 250:1 (at full signal)

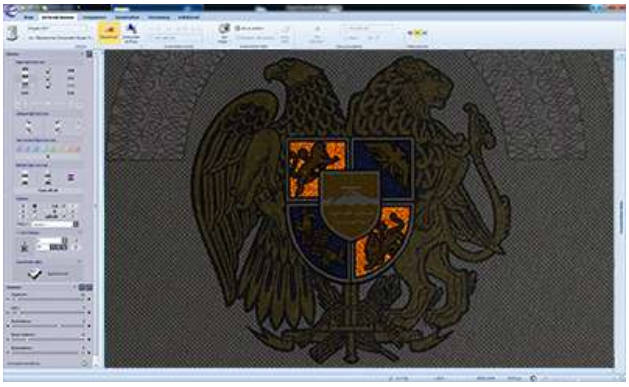
Dynamic range: 8.5 x 107 (system); 1300:1 for a single acquisition

Integration time: 1 ms to 65 seconds



Light source for anti-Stokes luminescence

Wavelength range, nm — 800–1100



XY translation stage for high-performance positioning along multiple axes and image stitching

Maximum displacement along the X-axis, not less than, mm — 70±2

Maximum displacement along the Y-axis, not less than, mm — 48±2

Built-in PC

CPU — Intel® Core™ i7 or better

RAM, Gb, min — 8

SSD, Gb, min — 120

Active cooling system with a heat sink and fan

ID and passport processing module

ICAO MRZ reading for ID-1, ID-2, ID-3 documents

RFID reader (ISO 14443) (built-in)

1D, 2D and QR codes processing

Position locked panels

All side panels can be locked in the position to accommodate larger items.

Built in sensors will prevent unintended exposure from high intensity UV and IR light if any of side panels is not properly closed.

Additional hardware specifications

Water resistant cover

Quartz Glass Holding Plate (length×width×height), mm — 200×200×5

Device overall dimensions (length×width×height), mm — 580×495×450

Weight, kg — 45 (netto)

Lifting Handles — two suitable handles for easy move and setup

Power supply, V; Hz — 110-240; 50-60

Power consumption, W — 200

Software modules

Device operation — Regula Forensic Studio software

Software updates — Lifetime free update

Multilingual interface

Software functionality

Automatic and manual focus, iris, white balance

Multi focus

Integration rate to increase sensitivity to faint images

Polarisafe feature — Polarised visible LEDs for viewing birefringent security features plus a linearly polarised LED crossed with the polarising filter

IR Luminescence light — 255 combinations

IR luminescence vizualization

Letterscreen++ — optional

Pulsed 365 nm UV LEDs for differentiating fluorescent and phosphorescent security ink

Super Resolution Imaging

Visualization of 3M™ Confirm™ laminate

Visualization of Invisible Personal Information (IPI - Hidden image)

Visualization of Optically Variable Inks (OVI)

Both vertical and horizontal scanning of Diffractive Optically-Variable Devices/Holograms

Integration with Regula Information Reference Systems

Additional software functionality

Image stitching (with X-Y Translation stage)

Saved document format — .BMP, .JPG, .TGA, .TIFF

Ability to save with the image the types of lighting, filters used, shooting date, etc.

Accumulation of images (camera integration time) — up to 50 frames (up to 180 sec)

Video recording

USB port 2.0 on the front panel for external devices

Image post processing

Recommended PC and monitor requirements (minimum)

Intel Core i7 processor or equivalent	RAM, Gb, min — 8
HDD, Gb, min — 520 (1TB recommended)	Graphics card with a minimum of 1GB Ram
32-inch 4K UHD Flat Panel Monitor	Operation System – Windows 10

1. Trinocular Stereo Microscope Regula 5003

Functionality

- Examination of security features in banknotes and travel documents in the mode of live video
- The microscope is based on the Greenough optical system which allows obtaining stereo images of examination objects
- Smooth magnification adjustment
- Coarse and fine focus adjustment
- Additional optical path for the digital video camera
- Document clamps

Light complexes with variable intensity control:

- ring
- transmitted (optional)
- gooseneck (optional)

Colour camera:

- type — CMOS
- effective pixels — 5 MP
- frame size, pixels — 2592×1944 (Full Frame)
- connection interface — USB 3.0

Magnification:

- optical — 0,8x to 14x
- objective magnification with 10x eyepieces — 8x to 140x
- objective magnification with 30x eyepieces — 24x to 420x
- for a 30 inch (75 cm) monitor*— 26x to 1330x

** – all magnifications are approximate*

Diopter adjustment, dptr — ±6

Interpupillary distance, mm — 52...76

Dimensions (length×width×height), mm — 330×310×450

Weight, kg, not more than — 5

Power consumption, W, not more than — 15

2. Calibration Kit

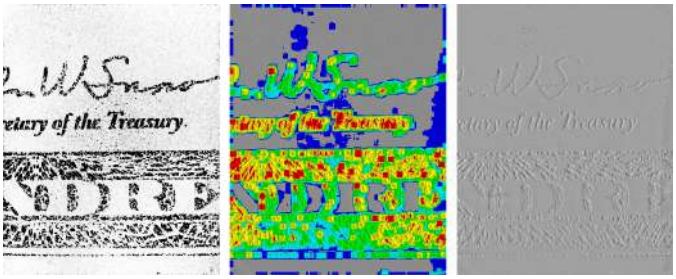
Calibrated White reference material. NIST traceable. For spectrometer reflectance reference.

UV 365 nm, 312 nm, 254 nm and Anti-stokes tester

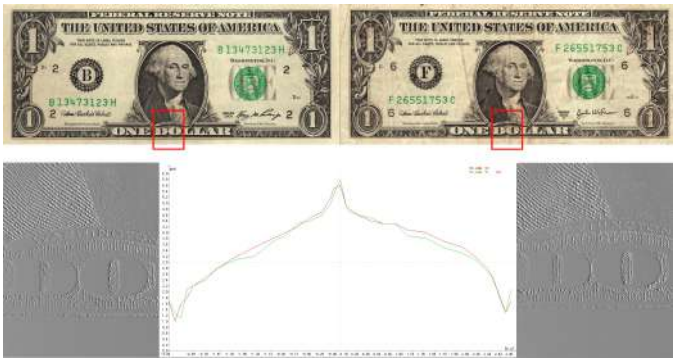
3. Visualizer of magnetic properties Regula 4197

Functionality

- Examination of magnetic security features in banknotes and travel documents in the mode of live video
- Visualization of magnetically hard and magnetically soft materials
- Possibility to distinguish magnetic inks by residual magnetization
- Carrying out non-destructive examination of objects with “hard” magnetic properties
- Reading latent magnetic strokes and codes
- Examination of damaged documents: reading blurred and crossed out texts printed with magnetic ink
- *Possibility to take magnetic ink intensity measurements in tesla (T)*



Black & White. Colour (magnetization intensity pattern). Raw



Magnetic measurements

Field of view, mm — 14×18

Spatial resolution of the optical input system, mkm:

- frame size 1024×1280 pixel — 14
- frame size 512×640 pixel — 28

Connection interface — USB

OS — Microsoft Windows 10

Dimensions (length×width×height), mm — 59×113×50

Weight, kg — 0,49

Power supply voltage from a USB port, V — 5

Power consumption, W, max — 2,5

4. Thermostage Regula 4168

Functionality

- Examination of images and elements of banknotes and travel documents containing thermochromic ink at different temperatures.
- Examination of a composite security feature Feel®-ID developed by Giesecke & Devrient company. Feel®-ID is based on optically variable and thermochromic effect.

Temperature range, ˚C — +30...+80 with a step of 1 ˚C

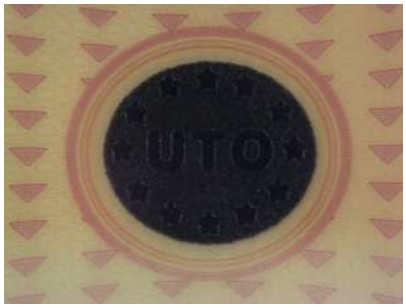
Heated area (length×width), mm — 78×48

Dimensions (length×width×height), mm — 170×78×16

Weight, kg — 0,25

Power supply voltage: powered by the USB port of the video comparator, V — 5

Power consumption, W, max — 15



Temperature +20 ˚C

Temperature +35 ˚C

Temperature +50 ˚C

5. Tilting stage Regula 4165

Tilt angle, max — ±30

Working area (length×width), mm — (180×110) ±1

Dimensions (length×width×height), mm, max — 230×112×42

Power supply voltage via a USB port, V — 5

Device weight, kg, max — 0,5

Rated current, A, max — 1

6. Polarizer Regula 4169

The device is intended for examination of a questioned document while changing the angle of polarization.

Angle of filter rotation — 0...360 with a step of 2˚

Field of view (diameter), mm — 70

Dimensions (length×width×height), mm, max — 195×140×40

Power supply voltage via a USB port, V — 5

Device weight, kg, max — 0.9

Rated current, A, max — 0.5

7. Professional 3D visualizer Regula 4162

Light sources:

- white (30 light sources)
- infrared, nm — 860±20 (60 light sources)

Dimensions (length×width×height), mm, max — 160×140×40

Device weight, kg, max — 0,5

Power supply voltage via a USB port, V — 5

Rated current, A, max — 0,5

Document examination in different operating modes

UV 365 – 1,3x magnification

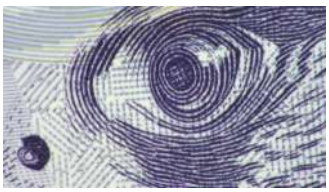
UV 313 – 1,3x magnification

UV 254 – 1,3x magnification

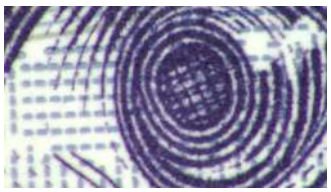
UV 395 – 1,3x magnification

Visible light range – reflected light – 1x magnification

Visible light range – reflected light – 4x magnification



Visible light range – reflected light – 10x magnification



Visible light range – reflected light – 29x magnification

Incident royal blue 450 nm – 3,39x magnification

Incident blue 470 nm – 4,29x magnification

IR top 870 nm – 1,49x magnification

IR top 940 – 1,49x magnification

Incident cyan 505 nm – 1,6x magnification

Bottom white – 1,2x magnification

Bottom IR 870 – 1,2x magnification

Bottom UV 365 nm – 2,2x magnification

Oblique white light – 7,49x magnification

Oblique white light – 7,49x magnification

Oblique IR light 870 – 9x magnification

Oblique IR light 870 – 9x magnification

Coaxial polarized white – 1,3x magnification

Coaxial polarized white – 1,3x magnification

Hologram