

EF-70 User Manual

Multi-Modal Biometrics Terminal: Unified Iris and Facial Recognition in a Single Capture

Version 0.6.0, September 2024



APPLICATION

Highly versatile enrollment and authentication station with flexible mounting options for physical access control and other ID management applications

About This Manual

EF-70 is an integrated biometric terminal that simultaneously captures facial and iris data using an innovative user positioning system. This manual contains the descriptions and operational instructions for EF-70 device. It is intended and written for system administrators who are in charge of overall operation including installation and management. We recommend you familiarize yourself with this manual in order to make use of the product correctly and effectively.



- The figures and screenshots in this guide are given for illustration purposes only and may differ from the actual product.
- Due to continuous technological improvements, the guide may not contain the most updated information. For further information not covered in this guide, please contact us at service@cmi-tech.com or sales@cmi-tech.com.

Conventions in This Manual

The following symbols are used throughout this manual. Make sure that you fully understand the meaning of each symbol and follow the instructions accompanied.

Symbol	Name	Description
	WARNING	Indicates information that should be followed with the utmost care. Failure to comply with a warning could cause severe damage to the equipment or injury to personnel.
	CAUTION	Indicates a potentially hazardous situation which, if not avoided, could result in equipment damage, data loss, performance degradation, or unexpected results.
	IMPORTANT	Emphasizes essential information required for user success.
	NOTE	Provides important supplemental information that might enhance users' understanding or alternative steps to accomplish their goals.
	TIP	Provides optional information to help users be more successful in their tasks.

Safety Instructions

Follow the safety instructions to use the product safely and prevent any risk of personal injury or damage to the product.



WARNING

Choosing Location

- DO NOT expose the product to direct sunlight, excess heat, open flames, corrosive gasses, moisture, or dust. Doing so may cause electrical shock, electrical short, or fire.
- DO NOT install the product near heaters, air conditioners, electrical fans, refrigerators, or water. Doing so may create the risk of a short circuit or fire caused by water or condensation that may come into contact with the product.
- DO NOT install the product in an environment that is susceptible to explosion.

Operation

- DO NOT let any type of liquid, mists, or sprays get into the product. Doing so may cause electrical shock, electrical short, or product damage.
- If smoke, odors or noise rise from the device, stop using the device immediately, disconnect the power cable, and contact our customer support.

Maintenance

- DO NOT attempt to disassemble, repair, or modify the device yourself. Opening or removing covers may expose you to electrical shock or other risks and may void your warranty. If the product does not work correctly, contact your dealer or our customer support.



CAUTION

Choosing Location

- Keep the front side of the device away from strong ambient light, direct sunlight, or both. Sunlight, halogen lamps or other strong illumination may degrade the performance of the device, that is, increase in failure-to-capture rates or occasional authentication problem.
- DO NOT install the product outdoors unless environmental factors such as water, temperature, or sunlight in the location are controlled by means of proper protection.
- DO NOT expose the product to high electro-magnetic radiation. Device failure or performance degradation may occur caused by electro-magnetic interference.
- DO NOT install the product next to devices that contain magnets or generate magnetic fields such as speakers. Device malfunction or performance degradation may occur caused by magnetic interference.

Installation

- DO NOT install the product on a surface subject to vibration or physical shock. Doing so can cause damage to the product.
- When you install the product on a wall, make sure that you secure the product with the provided fasteners. Dropping from the wall may cause damage to device casing, internal parts, or both.
- DO NOT install the power supply cable in a high-traffic area where people pass by. Doing so may create a trip hazard and cause the cable to become worn or frayed.
- Use only a power cord set complying with the national regulation of the countries intended for sale.
- Use only the power adapter which is either provided or approved by CMITECH for the product to operate properly and safely.
- DO NOT connect multiple devices to one power adapter. Overload on power adapter may cause over-heat or fire hazard.
- DO NOT use any type of extension cord to connect the product to a power supply.

Operation

- DO NOT use any sharp tools when pressing the buttons to prevent damage to the touch screen from scratches or cuts.

Maintenance

- When cleaning the product, wipe the product with a soft and dry cloth. Do not apply water, benzene, alcohol, or spray cleaner. These may cause product failure or fire.

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1. Introduction to EF-70

The EF-70 combined face and iris recognition system provides unprecedented subject ease of use for both through a highly innovative and intuitive user positioning approach in both modalities.

Subjects will view their own face in a front-facing, high resolution 5.0-inch color display to position themselves correctly within the real-time graphic interface.

For iris recognition, which has a working distance range of 40 to 70 cm, they will intuitively and naturally move to the correct position by simply centering and sizing their face image to the box within the display. In addition, the positioning box and the top border turn green to indicate proper distance positioning, after which the iris biometrics images are automatically collected, provided that the real time image quality metrics are satisfied. Vocalized commands give additional positioning guidance in real time. For face recognition, the working distance is 0.4 to 1.0 meters so that the subject needs only look at the display to initiate face image capture.

The EF-70 can be configured in automatic recognition mode in several dual factor and multi-factor combinations with the on-board card reader and PIN capabilities. In addition, the system meets industry standards for iris and face image capture making it ideal for large scale enrollment programs. In particular, the EF-70 exceeds the ISO 19794-6 iris image spatial resolution specification, delivering an impressive 3.0 lp/mm at 50% contrast.

The system is extremely fast in both subject detection and image capture. It utilizes an integrated time-of-flight (TOF) proximity and distance sensor for fast and precise detection of all subjects as they approach the system. Typical image capture times in recognition mode will be 0.5 seconds or less.

For all specifications, please see [Specifications](#) section.

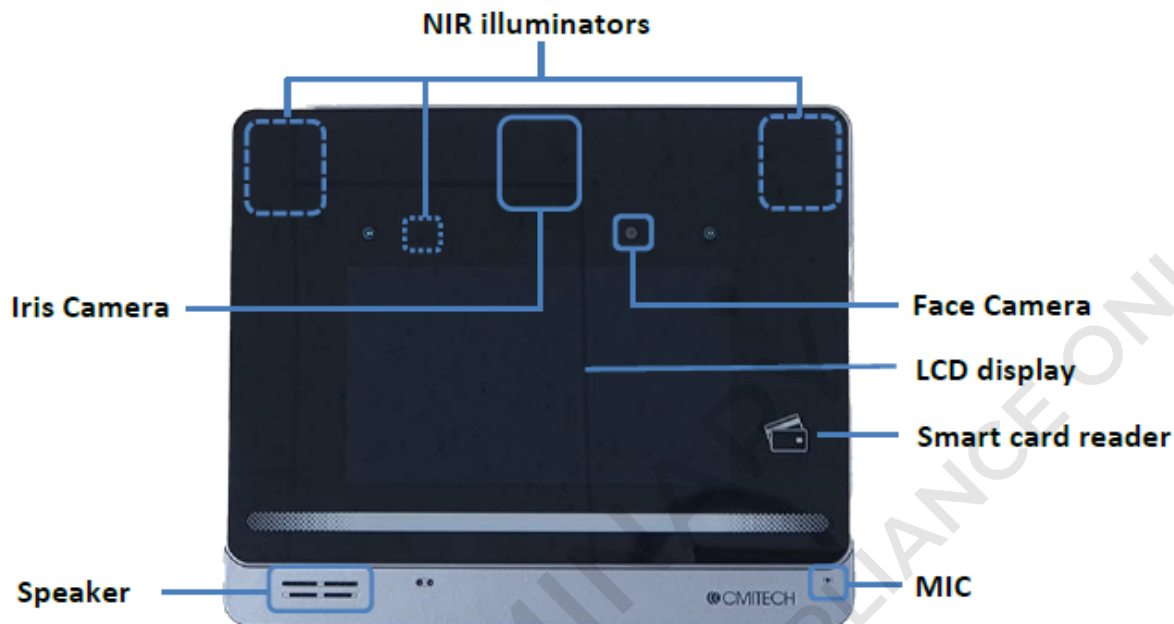
1.1. Key Features

Feature	User Advantages
State-of-the-art optical design	The optical design includes utilizing highest quality optics and very fast shutter speeds, which allows the systems to exceed industry standards for image quality.
Multiple camera design	Four cameras for ultra-fast subject positioning and flexibility in either face or iris recognitions mode
Advanced, proprietary stereoscopic eye localization in iris modality	The EF-70 accurately locates the position of both eyes in 3D to optimize system speed, subject ease of positioning and iris image quality. This function enables reliable subject distance positioning indicators shown as blue, green or red color distance positioning codes.
Highest image quality	Meets or exceeds the ISO 19794-6 2011 and ISO 29794-6 iris imaging specifications.
Compact, lightweight design	Optimizes placement or mounting options, including wall, swing arm, or e-Gate mounting solutions.
Simplest of iris recognition user instructions	Very simple and repeatable subject instructions: • Position face within guide box in display (like smartphone “selfie”) • Move toward the system to size head to box • Once within range, the box and indicator bar will turn green to indicate proper positioning Iris image capture is automatic once subject is in proper position and real time image quality metrics parameters are met.
Intuitive face recognition user interface	Modeled after latest smart-phone user displays, the user experience will be intuitive and effortless for almost all subjects.
Iris recognition stand-off distance and depth of capture	40 to 70 cm, ensuring robust, fast and easy positioning. Comfortable range for subjects in wide variety of desktop, countertop, kiosk or wall mount placements.
Face capture range	From 0.4 to 1.0 meters

Feature	User Advantages
Real time image quality metrics	Image quality metrics included in capture algorithm: • Subject gaze angle (i.e. whether the subject is looking directly ahead at the imager) • Subject motion • Focus • Usable iris area (occlusion)
Simultaneous face image capture in iris recognition mode	A face image is always collected at same time as capture of iris images, so that the minimum data record consists of one face image and two iris images.
Large, embedded data bases for on-board identification and authentication	Standard on-board (local) iris database of 200,000 subjects (iris template-pairs), with matching speed of under 1.0 second in 1:N mode for full database. Face template data base size of 50,000 subjects.
Versatile dual and multi-factor configuration support	Various authentication configurations with biometrics modalities and PIN or card
Standard embedded MIFARE card reader	Supports MIFARE, DESFire, MIFARE Plus, and MIFARE Classic cards (ISO/IEC 14443) including latest EV3 version
Optional HID card reader	Optional hardware version replaces MIFARE reader with HID OmniKey chipset reader for HID iClass and iClass SE cards
OSDP	Supported through RS-485 terminals
Template-on-card (TOC)	Supported for both MIFARE and HID card readers
Cable connectors	For access control (AC) version, plug-in connector kit for all cabling (except RJ-45 Ethernet) included in accessories package
Card reader	Standard in AC version only: embedded MiFare / DesFire card reader for support of dual factor authentication, or backup authentication for special case users.
I/O interface	Standard connections include TCP/IP(Ethernet), Wiegand IN, Wiegand OUT, 4 x GPI, 2 x RS-485, RS-232, contact relay, tamper, factory reset, SIM socket (factory option)
Language support	Display languages of English, Korea, Traditional Chinese, Simplified Chinese, Japanese, Spanish, Italian, Arabic, and Russian.
Voice positioning commands	Vocalizations for positioning guidance can be modified by local systems integrators through modification of on-board .wav files, or by special request to CMITech support.

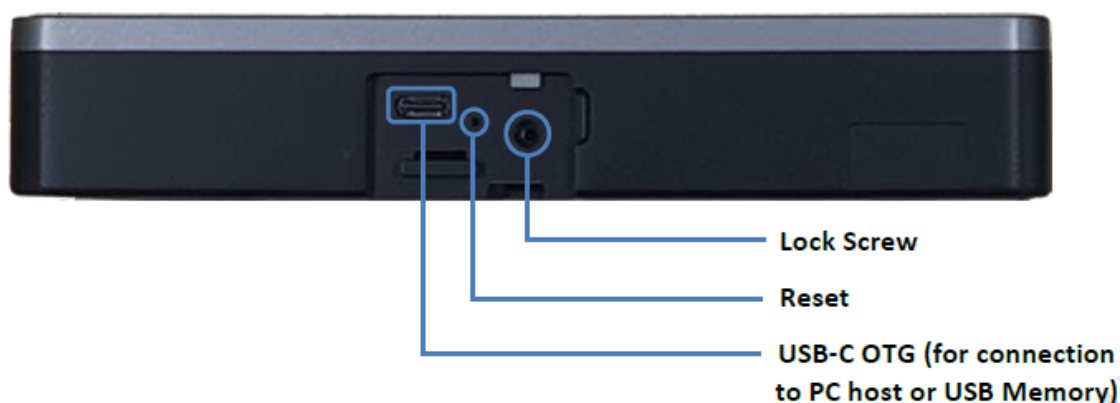
1.2. Parts and Controls

1.2.1. Front



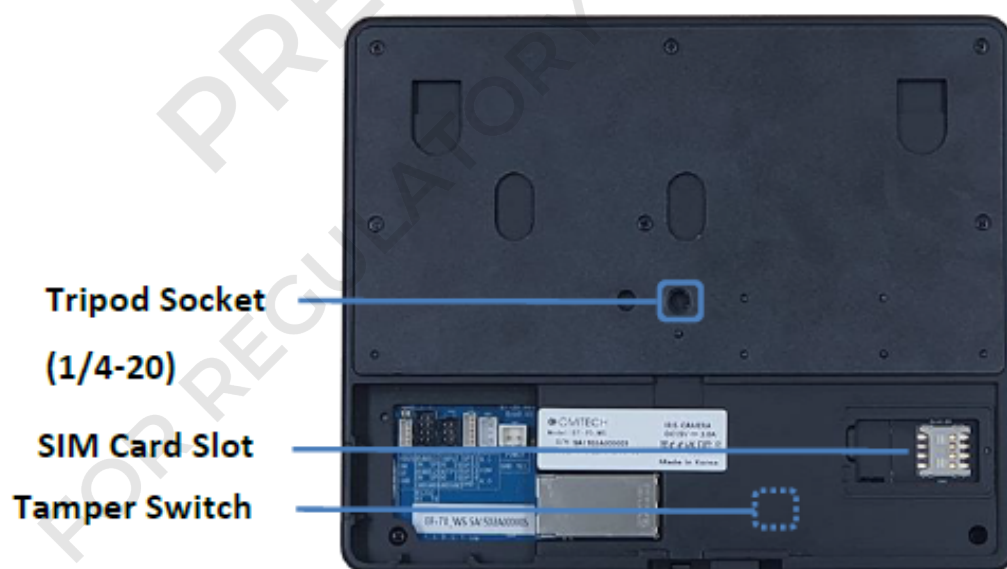
Name	Description	Note
Iris Camera	Captures the iris images	
Face Camera	Captures the face images	
NIR Illuminators	Illuminates the face using the NIR lighting when capturing the faces	
LCD display	Shows preview images before capture and provides a graphical interface for enrollment and device configuration	
Smart card reader	Indicates the area where RF cards can be read	
Speaker	Delivers sound from device	
Mic	Captures sound from the user	

1.2.2. Bottom



Name	Description	Note
Lock Screw	Attaches the mounting plate to the unit	
USB-C OTG port	Connects a USB flash drive or a PC host	
Reset button	Restarts device	

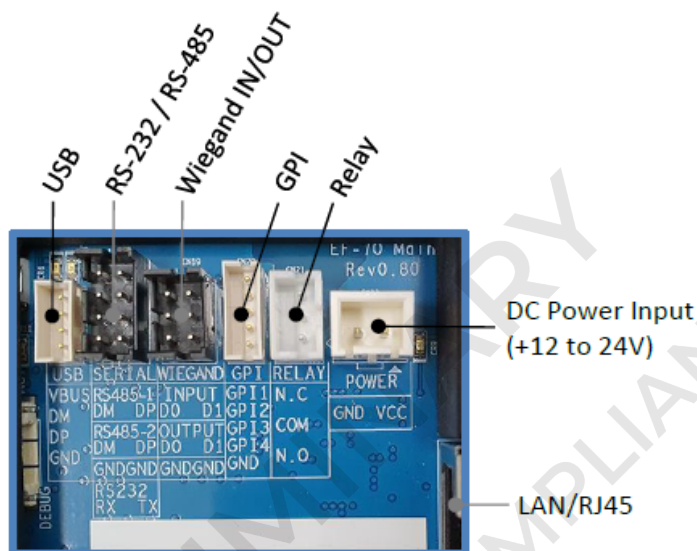
1.2.3. Rear



Name	Description	Note
Tripod socket	Attaches the unit with a tripod that has the standard 1/4-20 UNC screw	

Name	Description	Note
SIM card slot	A SIM card can be inserted	Optional
Tamper Switch	Starts an alarm, if configured, when a physical tampering attempt is detected	Switch type: Magnetic

1.2.4. Connector



Name	Description	Note
USB	Connects a USB cable	
RS-232 / RS-485	Connects a RS-485 or RS-232 cable	
Wiegand IN / OUT	Connects the Wiegand cable as input or output	
GPI	Connects a GPI cable	
Relay	Connect a relay cable	
Power Input	Connects the power cable	
LAN/RJ45	Connects an ethernet cable	

2. Using EF-70

2.1. Overview

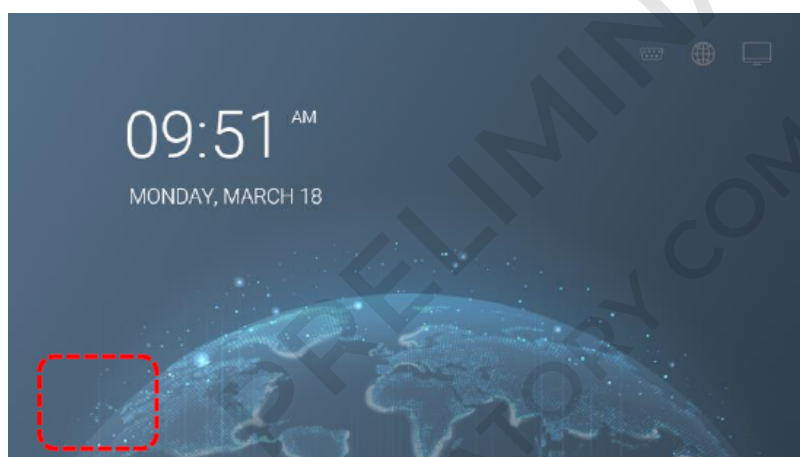
The on-board demonstration application shows the full capabilities of the EF-70 for image capture including subject positioning with the face display user interface, enrollment, and on-board matching (authentication).

The system boots up in this demo application. It is initiated by the video based motion detector that first finds the subject from about 1 meter distance, and then continues the natural iris and face image capture sequence for capture in recognition or authentication mode.

2.2. Enrollment

This section gives the procedural information to enroll users to the device.

1. To switch to enrollment mode, press the area on the lower-left of main screen.



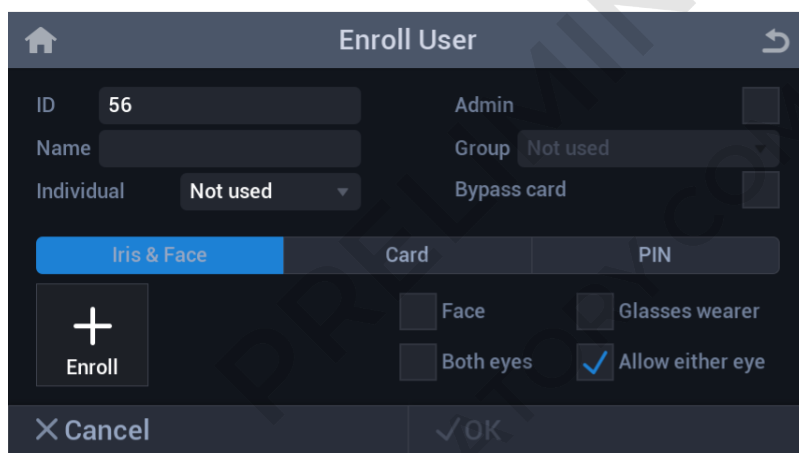
If the system is in image capture mode, press Home icon (🏠) on top left of active user interface display, which will stop Recognition mode and return system to Launcher page.

2. The main User screen appears.

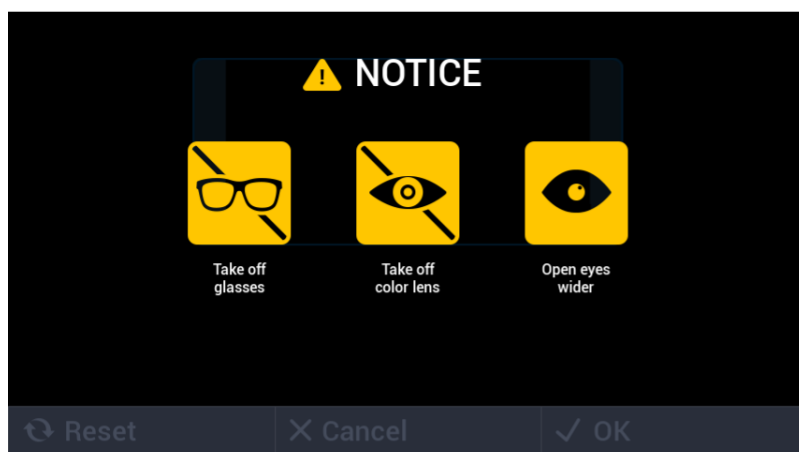


This user screen also allows simple database management. By tapping the **Delete** icon in the bottom right, one can easily delete information of enrolled users.

- To enroll a new user, press the **Enroll** icon to bring up **Enroll User** screen.



- Press the plus (+) button in the bottom left to capture image of the new user.
- An instruction screen will appear for 3 to 5 seconds, and then switch to the user interface. (The timing of this display can be changed in Settings.)



6. After successfully capturing iris images, click ✓ **OK** to accept images. The system then returns to Enroll User screen.
7. Click on the **Name** field to enter name of subject, then click on ✓ **OK** to complete enrollment.
8. Press the Home icon (🏠) to return to the Launcher page to re-start Recognition and Authentication mode.

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2.3. Authentication

EF-70 detects a subject and captures the images of subject's irises and face automatically once it's at an appropriate distance and position.

1. Position yourself facing straight at the LCD display. When the device detects your movement within 1.0meter range, it initiates the image capture sequence. A rectangular-shaped user guide box will appear on the screen. If it is BLUE, it means you are too far from the device. Move forward.



2. Move towards the system to size your face to the LCD display. If the user guide box flashes GREEN, it means you are at an appropriate position. Stop and hold your position until the device captures image of your face and/or iris.



3. If you are standing too close to the device, your face will not fit in the LCD display. When the user guide box flashes RED, it means the device cannot capture your image because you are too close. Move back until the box turns green.

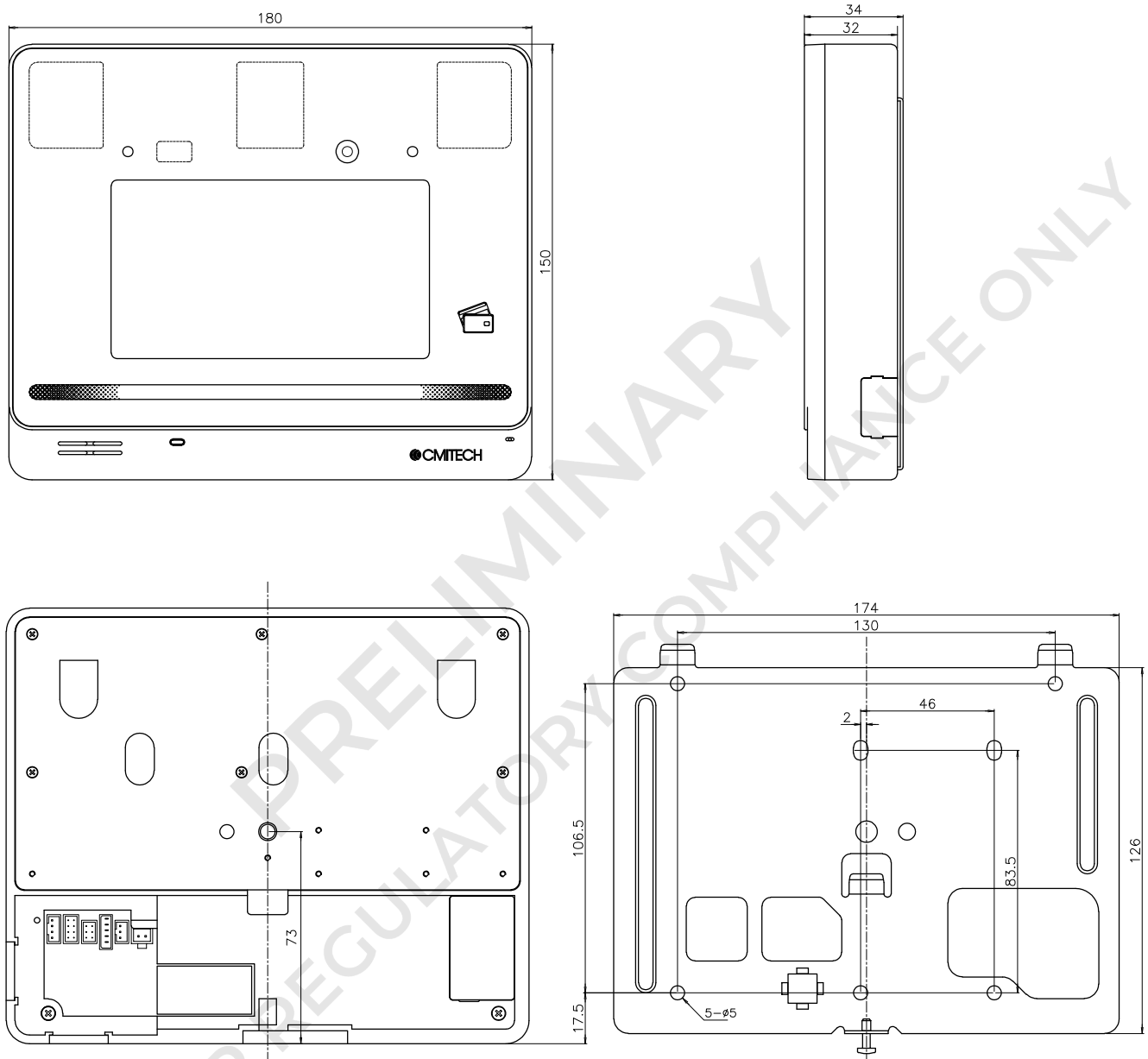


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3. Product Specifications

3.1. Mechanical Specifications

Dimension (unit: mm)



3.2. Technical Specifications

Specification	Description
Embedded CPU	ARM quad-core
On-board iris and face algorithms for embedded encoding and matching	Standard in all configurations
Supported biometrics modes	Iris only, face only, iris first then face, iris or face, iris and face
Flexible Software Development Kit (SDK) configurations	High Level SDKs offered in C# (.NET), C++, C, and Java versions. Includes host side reference application to connect to EF-70 resident services layer so that integrator does not need to program EF-70 device.
Configuration Utility software application	This host side software application provides centralized (network) control and setup of system configuration, Wiegand settings, and IP address settings, as well as providing for centralized FW upgrades.
Dimensions	180 x 150 x 32 mm (7.1 x 5.9 x 1.3 inches) without mounting wall plate
Weight	900 g without wall plate
On-board data storage	Up to 200,000 iris template pairs with match speed about 1.0 second either in 1:N mode (identification) or 1:1 mode (verification).
	Up to 50,000 face templates
Dual factor authentication	Iris or face with either smart card or PIN as second factor
Iris image pixel resolution	Exceeds ISO 19794-6 2011 and ISO 29794-6 iris imaging standards with MTF of 3.0 lp / mm at 50% contrast
Iris image output	640 x 480 pixels, 8bit depth, supports multiple formats
Adjustable FAR (false accept rate)	Adjustable iris algorithm threshold range of 10^{-5} to 10^{-14} FMR at 10^{-6} FNMR. Default is FMR of 10^{-8} .
Enrollment mode operational iris imaging distance (stand-off range) and depth of field	50 to 70 cm range (20 cm depth of capture range) in enrollment mode. Meets or exceeds ISO 19794-6 2011 and 29794-6 specifications.
Recognition mode operational iris imaging distance	Recognition mode provides up to 40 to 70 cm range (30 cm depth of capture) for small scale applications. Does not necessarily meet ISO specifications. Range selectable in SDK.

Specification	Description
Iris positioning indicators	Face positioning within box in LCD serves to center users face in X-Y dimensions. Subject will fit size of face to box size within LCD display for distance(Z) positioning, with simultaneous color bar display for correct distance positioning: • Blue: too far away • Green: OK • Red: too close Supplemental voice distance feedback is also simultaneous. Vocalizations convertible to local language via .wav file substitution.
Auto tilt for iris imaging	Internal auto tilt range of +25 to -25 degrees, which corresponds to height range of approximately 50 cm. System can be mounted at any height to accommodate local user population. Contact CMITech for mounting recommendations.
Time of iris image capture and authentication	Typically about 0.5 second from time the subject's eyes are properly placed within capture volume.
IR illumination for iris imaging	Dual wavelength LEDs (spectral range of 700 to 900 nm) that conforms to ISO best practices for iris imaging.
Face image capture	Standard 24bit color and NIR images, both accessible from SDK
Face recognition	Standard on-board encoding and matching
Audio	1W embedded speaker
Operating temperature range	-20 to 50°C
Humidity range	10 to 90% RH, non-condensing
Illuminator eye safety standard	IEC 62471
Network interface, standard	10/100/1000 Base-T Ethernet (RJ45 connector), USB OTG support
RFID Card reader	Integrated CMITech MiFare and DESFire reader as standard HID Omnikey embedded chipset option for iClass cards
SIM card socket	Factory option
Mounting	¼ - 20 UNC (consumer camera tripod mount type) standard

Specification	Description
Accessories	Detachable wall mount plate for easy wall installation.
	Terminal and wired connectors for: Wiegand IN, Wiegand OUT, RS-232, 2 x RS-485, 4 x GPI, dry contact relay
OSDP	Yes, supported through RS-485 port
Power requirement	DC 15 V AC power adapter included in all versions.
Power consumption	25 W
POE+	Supported (optional)

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Appendix A: Legal Information

A.1. Disclaimer

The words of which the initial letter is capitalized have meanings defined under the following conditions. The following definitions shall have the same meaning regardless of whether they appear in singular or in plural.

For the purposes of this Disclaimer:

- **Company** (referred to as either "the Company", "We", "Us" or "Our" in this Disclaimer) refers to CMITech Co. Ltd.
- **You** means the individual accessing the Product, or the company, or other legal entity on behalf of which such individual is accessing or using the Product, as applicable.
- **Product** means the electronic device provided by the Company named EF-70 and its manual.

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Appendix B: Regulatory Information

B.1. FCC compliance statement

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.



This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment to an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Changes or modifications to this product not authorized by CMITech could void the electromagnetic compatibility (EMC) and wireless compliance and negate your authority to operate the product.

This product has demonstrated EMC compliance under conditions that included the use of compliant peripheral devices and shielded cables between system components. It is important that you use compliant peripheral devices and shielded cables between system components to reduce the possibility of causing interference to radios, television sets, and other electronic devices.

The antenna(s) used for this transmitter must not be co-located or operating in conjunction with any other antenna or transmitter, except in accordance with FCC multi-transmitter product procedures.

A minimum separation distance of 20cm must be maintained between the antenna and the

person for this appliance to satisfy the RF exposure requirements.

B.2. EU Declaration of Conformity (CE)

This product is CE marked according to the provisions of the RED (Radio Equipment Directive) Directive (2014/53/EU). CMITech Co., Ltd. hereby declares that this product is in compliance with the essential requirements and other relevant provisions of Directive 2014/53/EU. This device is a class 1 radio device according to the directive. For more information, contact us using the following contact information.

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Appendix C: Contact Information

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