GILARDONI S.p.A.

User Manual
FEP ME

Digitally signed by Bîrsan Vitalie
Date: 2023.10.16 10:34:25 EEST
Reason: MoldSign Signature
Location: Moldova

64860043–006

Remarks

Information contained in this document is subject to change without warning.

GILARDONI RX PROVIDES NO WARRANTY WHATSOEVER REGARDING THIS MANUAL, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. GILARDONI RX cannot be held responsible for any errors contained herein, or for any damages, direct, indirect, incidental or consequential to the supply, to the performance or to the use of this manual.

For technical assistance please use the following contact details:

Phone: (+39) 0341-705.111
Fax: (+39) 0341-735.046
E-mail: service@gilardoni.it

Original reference manual

Rev. 000 22.10.09 (issuing)
Rev. 001 06.07.10 (Full revision. Added FEP ME 975HC and 640 AMX – RdM 48/10)
Rev. 002 15.04.11 (Added 640 LP SA, modified equipment description RdM 062/11)
Rev. 003 21.07.11 (Added description “pipe” alarm – RdM 096/11))
Rev. 004 27/07/11 (Modified references X ray tube voltage up to 160 kV - RdM 101/11)
Rev. 005 06/12/12 (Added references to FEP ME 640 LP SA - RdM 132/12)
Rev. 006

Issuing:	Check:	Approval:

Any communication regarding this publication must be sent to:

GILARDONI S.p.A.

At the following address:

Via **Arturo Gilardoni**, 1
23826 Mandello del Lario (LC) - Italy
Tel: (+39) 0341-705.111
Fax: (+39) 0341-735.046
E-mail: gx@gilardoni.it

WARNING!

In order to use this equipment correctly and safely it is extremely important that you carefully read and observe the information and requirements contained in this manual.
Never perform any operation on the equipment without consulting this manual.
This manual has been designed for usage by qualified and trained personnel only.
Carefully keep all documents coming with the equipment for future reference.
GILARDONI S.p.A. accepts no responsibility for any damages or injuries arising from incorrect use of the equipment or from equipment tampering by the user.

Information contained in this manual is subject to change without warning and is not binding for the manufacturer.

Table of contents

1. Preface

Thank you for purchasing your Gilardoni S.p.A FEP ME equipment.
This Manual refers to FEP ME products in all available sizes. Typical differences between each of the products are also described in detail.

1.1. Information contained in the manual

Gilardoni S.p.A. has made all reasonable efforts to make sure that the information contained in this manual is comprehensive and accurate in principle, however we cannot exclude the possible presence of technical or publishing errors, for which Gilardoni S.p.A. accepts no responsibility. In view of the policy of constant quality improvement and technological advancement pursued by Gilardoni S.p.A., information contained herein is subject to change without warning.
Depending on the configuration chosen at purchasing time, the equipment can have functions or features not described in this manual.

1.2. Safety warnings

The FEP ME inspection equipment emits ionising radiations inside the luggage inspection tunnel and has moving mechanical parts. Although the safety measures adopted by Gilardoni S.p.A. ensure protection for both users and operators, you must in addition observe the following basic precautions:

- Never perform operations on the system without having thoroughly and carefully read this manual, and making sure that you fully understand its content.

- Never put your hands on the conveyor belt and on the coupled roller deck (if any), and never allow anyone else to do so; be aware of the normal unavoidable risks associated with the presence of moving mechanical parts. If due to turnout reasons or duty constraints you are not sure that you can enforce this rule, arrange for fences or obstacles to prevent children and/or pets from inadvertently coming into contact with moving mechanical parts.

- Never place any part of your body into the tunnel beyond the protecting lead curtains at both the inlet and the outlet of the inspection compartment, and never allow third parties to do it. In particular don't allow hasty passengers to take their luggage before it has fully left the inspection tunnel, as they risk exposing themselves to ionising radiation.

- Never operate the system with the protecting lead curtains removed, altered or torn.

- The only people authorised to perform technical operations on the equipment are Gilardoni Assistance technicians, or people certified or authorised in writing by Gilardoni Assistance itself. Be aware that performing operations on the equipment without having the necessary skills is a tampering violation, exposing you and third parties to risks for which Gilardoni S.p.A. can in no case take any responsibility.

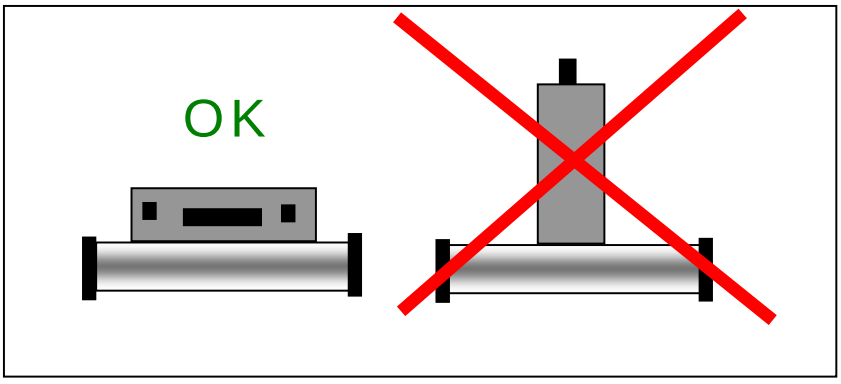
The following warning labels are fixed to the equipment:

1. Label signalling the presence of ionising radiation inside the tunnel during the ray emission stage. There are 2 labels of this kind, located over the entrance and exit of the inspection tunnel (except systems for French market).

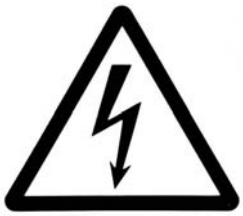
2. Label signalling the presence of ionising radiation inside the tunnel during the ray emission stage. There are 2 labels of this kind, located over the entrance and exit of the inspection tunnel (only systems for French market).

3. Label signalling the danger of putting any part of the body inside the tunnel. There are 2 labels of this kind, located over the entrance and exit of the inspection tunnel.

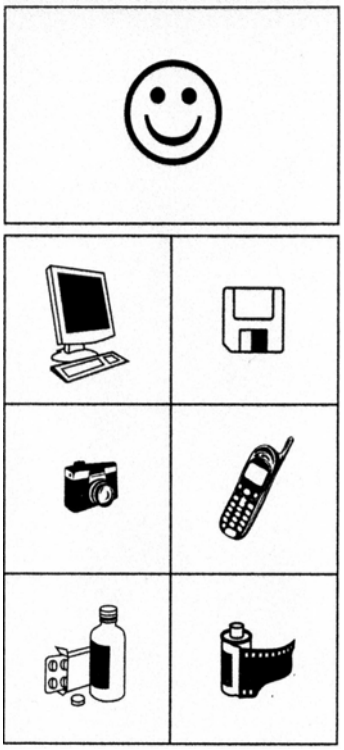
4. Label showing how to correctly put the bag on the belt. There are 2 labels of this kind, located over the entrance and exit of the inspection tunnel.



5. Label indicating that the fairings on which it is placed protect high-voltage components. There are 2 labels of this kind, located on the 2 central fairings of the equipment.



6. Label indicating that the radiation inside the tunnel doesn't damage electronic devices, films, medicines ecc. (only systems for French market).



1.2.1. Restrictions

Information contained in this manual is the property of Gilardoni S.p.A. and is confidential. For this reason no part of this manual can be photocopied or reproduced by any means, or translated into another language without the written authorisation of Gilardoni S.p.A.

Images generated by equipment like the FEP ME contain sensitive and confidential information. Neither system nor software aim at providing positive interpretations; their only purpose is supporting the operator in charge of interpreting the images and to aid them in making the decisions that follow. No image generated by such equipment can be supplied to third parties without the written authorisation of Gilardoni S.p.A.

Should the Customer fail to observe any of the above conditions, Gilardoni S.p.A. reserves the right to terminate the contract, unless the Customer obeys the request by Gilardoni S.p.A. to remedy the breach within thirty (30) days.

1.2.2. Software program restrictions

Software programs used by equipment like the FEP ME are the property of Gilardoni S.p.A., therefore they cannot be copied, reproduced, used on hardware platforms other than those on which they have been installed at supply, reverse engineered, disassembled, decompiled or tampered with in any other way without written authorisation by Gilardoni S.p.A., except for cases authorised by law.

Software programs are to be considered as an integral part of the FEP ME equipment system.

The Customer acknowledges that he has no rights over the software, other than the property of the physical medium, an integral part of the equipment at delivery. The Customers acknowledge and accepts that the software is subject to copyright and protected by the relevant laws. If the software has been developed by third party suppliers mentioned in the copyright notices accompanying the software, they will be able to directly proceed against Customers guilty of any copyright infringement or contract violation.

1.2.3. Guarantee validity

Unless otherwise stated by particular and specific clauses, inserted in the purchasing contract documents, FEP ME equipment is covered by a 12-month guarantee starting from the shipping date.

Gilardoni S.p.A. cannot be held responsible for any damage arising from incorrect interpretation of information, improper use, unauthorised changes, incorrect maintenance operations or defects due to unauthorised use of non genuine equipment and/or spare parts, not provided by Gilardoni S.p.A. on FEP ME equipment.

The customer must notify in writing Gilardoni S.p.A. about any complaints within thirty (30) days of the guarantee period expiry date.

1.2.4. Guarantee validity for software programs

Gilardoni S.p.A. guarantees that for a period of ninety (90) days from the purchase date all pre-installed Gilardoni software will execute program statements, provided all files have been properly installed.

Gilardoni S.p.A. doesn't provide for the supply of software on mobile media.

Gilardoni S.p.A. doesn't guarantee the software operation will be uninterrupted or error free. If this software product is unable to execute program statements during the guarantee period, the only

compensation for the customer will be the replacement of the software supplied by Gilardoni S.p.A. or the refund of the purchasing price upon return of the product and of all software copies. This will include the installation instructions and the remote assistance (by phone or e-mail).

Gilardoni S.p.A. guarantees the compliance of the pre-installed OS version configuration for one (1) year of the purchasing date.

The operating environment, consisting of operating systems, libraries and applications supplied to support the Software design developed by Gilardoni S.p.A., obeys the rules and licenses defined by each developer.

In compliance with the directives regarding "Open Source" licences (GPL, LGPL, ...), you can get the modified source code by directly contacting Gilardoni S.p.A. at the Management and Factory address below.

Any other software products present in the equipment are guaranteed by the relevant developers and not by Gilardoni S.p.A.

1.2.5. Management and Factory address

For any requirement associated with the use of FEP ME please contact Gilardoni S.p.A. at the following address.

Gilardoni S.p.A.
Via **Arturo Gilardoni**, 1
23826 Mandello del Lario (Lc) – Italy
Phone: (+39) 0341 - 705.111
Fax: (+39) 0341 - 735.046
E-mail: service@gilardoni.it

2. Introduction

The FEP ME represents a revolutionary step forward in safety within manual luggage checking systems that use X-rays.

By combining a high performance X-ray generator and a new acquisition system, developed in the Gilardoni research laboratories, the finest image quality is ensured. In addition the units also feature the highest levels of material resolution and penetration currently available on the market.

The system architecture, which is easily network connectable, ensures that the equipment can be integrated with the most sophisticated computer networks enabling possible control from different workstations, processing, image and session filing and remote diagnostics.

Figure 1 – FEP ME 640/640 LP

The system also includes a TIP (Threat Image Projection) optional function, complying with the most recent international standards.

Figure 2 – FEP ME 755

Thanks to its characteristics of ease of use and inspection speed, the FEP ME is the ideal system to support our clients current needs, especially accelerating hand luggage inspections by supporting traffic volumes double that compared with previous systems, as well as maximizing the usage of the clients trained operators.

Figure 3 – FEP ME 1000 HC

FEP ME performance can be further increased by a wide range of accessories.

Figure 4 – FEP ME 536

Figure 5 – FEP ME 1000

Figure 6 – FEP ME 975

Figure 7 – FEP ME 975 HC

Figure 8 – FEP ME 640 LP SA

Figure 9 – FEP ME 640 AMX

2.1. Operating principle

An item is taken by the conveyor belt into the inspection tunnel. When inside the fitted photocells are interrupted triggering x-ray emission. The x-ray generator is located under the conveyor belt and has a collimator shaping the x-ray beam to make it similar to a blade cutting through the whole inspection tunnel section.

As the luggage goes through the tunnel it is intersected by this x-ray beam which, after interacting with, and being filtered by, the items under examination hits a double set of detectors (photodiodes) located in an “L” shape above the tunnel and on its side.

After a very short sampling period, signals emitted by both sets of photodiodes are acquired and in this way the item is scanned section by section.

Data generated by the acquisition system described above is sent through to a dynamic store logic unit (server) and becomes available on the computer internal bus.

Data is processed inside the logic unit (server) and made available for display by clients either resident on the same logic unit or on remote logic units.

Using a video board, X-ray images of the items analysed are displayed on the monitor section by section as the item cuts through the x-ray beam and the data from each cut is acquired.

The resulting image can be displayed on 1 or 2 monitors either in monochrome like the original X-ray image or in colour by redigitalising the original X-ray image with colours and associating these colours to the types of material that constitute the item analysed.

Figures of FEP ME 640 are shown for reference in this manual.

Some systems, named dualview, are characterized by the presence of two generators and relative acquisition system, so that the baggage is likely acquired as two different angles, consequently the two different images shown separately on two monitors increase the recognition capability.

3. System composition

The system consists of:
- Inspection unit (tunnel)
- Control station

The inspection unit consists of:
- mechanical chassis with lead covered tunnel;
- x-ray generator (on some model two x-ray generator);
- conveyor belt to move the luggage through the x-ray examination area;
- logic unit;
- solid state dual photodiode detection system (including signal digitization circuit), which analyses the received radiation emerging from the luggage (on some model two dual photodiode detection system);
- Uninterruptible Power Supply (UPS) (Optional);

The control station consists of:
- table;
- image display monitor;
- control console;

3.1. Inspection unit

3.1.1. Chassis

The chassis consists of a welded steel tubular frame which contains the lead tunnel on top of the unit and the integrated x-ray generator, power electronics, logic unit, on the bottom. The “L” shaped metal unit containing the acquisition modules with the photodiodes is located above the tunnel. The anti-X curtains which are installed on the tunnel inlet and outlet are made of a special high-flexibility lead rubber. The tunnel lead shielding parts have differentiated protection (increased in the collimated x-ray zone) and are joined to the chassis by welding. The ‘X-Ray emission’ warning light and ‘Emergency Stop’ button are located on the tunnel inlet and outlet.

3.1.2. Conveyor belt

The structure supporting the conveyor belt drive is made of extruded aluminium. The conveyor belt is made from a material transparent to X-rays and with a surface that has a high-resistance to both abrasion and aggressive liquids, it is an open loop conveyor with a plastic hinge closure to ensure very short shutdowns when a replacement belt is necessary. The inverter controls the conveyor movement and tracks the position of the luggage inside the tunnel and to properly manage the image display when the item stops and restarts under the X-ray beam.

3.1.3. Logic unit

The Logic unit is a very comprehensive sub-system, consisting of a multi-processor computer with internal mass memory and a set of electrical interfaces to control and manage the internal sub-systems. The Logic unit controls several fundamental features to ensure that the system operates correctly. The unit synchronizes the data acquisition from the photodiodes, manages all of the unit’s relevant sub-systems, processes the acquired data, and supports the relevant display or transmits data for display on a remote client.

3.1.4. Uninterruptible Power Supply (UPS)

In the case of a mains power supply failure, the UPS maintains power to the system and monitors long enough for a controlled shutdown of the system to be achieved. UPS is optional.

3.1.5. High-frequency fed X-ray generator

The multi-stage high voltage cascade x-ray generator is operated at high-frequency and includes a low filtration X-ray tube which is ideal for viewing both organic and plastic substances. The use of this special type of electronic circuit to power the HV generator allows us to precisely check X-ray generation and ensure that high stability and constant energy radiation is emitted. This stability vastly increases the photodiode response quality, and this is fundamental to correctly identifying the materials under examination.

A collimator is included which is useful to limit and control laminar x-ray beams (a second collimator is also located under the conveyor belt to precisely limit the x-ray beam).

FEP ME 536

Voltage to RX tube	150 kV
Current to RX tube	0.5 mA
Focal spot	1.2 mm according to EN 12543 standard
HV circuit	Continuous voltage with 75kHz high-frequency power supply
Cooling	Forced air
HV protection	Metal container connected to ground
Anti-X protection	Integral with lead coating

FEP ME 640/640 LP/640 LP SA

Voltage to RX tube	150 kV
Current to RX tube	0.5 mA
Focal spot	1.2 mm according to EN 12543 standard
HV circuit	Continuous voltage with 75kHz high-frequency power supply
Cooling	Forced air
HV protection	Metal container connected to ground
Anti-X protection	Integral with lead coating

FEP ME 755

Voltage to RX tube	150 kV
Current to RX tube	0.7 mA
Focal spot	1.2 mm according to EN 12543 standard
HV circuit	Continuous voltage with 30kHz high-frequency power supply
Cooling	Forced air
HV protection	Metal container connected to ground
Anti-X protection	Integral with lead coating

FEP ME 975 HC

Voltage to RX tube	160 kV
Current to RX tube	1,5 mA
Focal spot	1,2 mm according to EN 12543 standard
HV circuit	Continuous voltage with 75kHz high-frequency power supply
Cooling	Forced air
HV protection	Metal container connected to ground
Anti-X protection	Integral with lead coating

FEP ME 975

Voltage to RX tube	160 kV
Current to RX tube	1,0 mA
Focal spot	1,2 mm according to EN 12543 standard
HV circuit	Continuous voltage with 75kHz high-frequency power supply
Cooling	Forced air
HV protection	Metal container connected to ground
Anti-X protection	Integral with lead coating

FEP ME 1000 HC

Voltage to RX tube	160 kV
Current to RX tube	2.0 mA
Focal spot	1.2 mm according to EN 12543 standard
HV circuit	Continuous voltage with 75kHz high-frequency power supply
Cooling	Forced air
HV protection	Metal container connected to ground
Anti-X protection	Integral with lead coating

FEP ME 1000

Voltage to RX tube	160 kV
Current to RX tube	2,0 mA
Focal spot	1,2 mm according to EN 12543 standard
HV circuit	Continuous voltage with 75kHz high-frequency power supply
Cooling	Forced air
HV protection	Metal container connected to ground
Anti-X protection	Integral with lead coating

3.1.6. X-ray image detector

The detection system consists of a double set of photodiodes located in an 'L' shape. This allows the system to acquire a dual global image of the baggage with no dead areas and diagonal protection giving a separation to oppositely located items. The photodiodes that are used have been designed and manufactured specifically for use in the baggage check field, with each detector dimensionally optimised to enhance response time and the silicon structure has been configured to match the scintillator emission frequency. Our state of the art detector technology has the scintillators directly coupled to the photodiodes and this novel manufacturing solution allows us to remove the interference caused by light being emitted between any two adjacent elements. The detectors are also optimised to properly 'highlight' X-energy bands which in turn help us to recognize the physical characteristics of the materials under inspection. The photodiodes are amplified individually utilising extremely low noise amplifiers located close to photodiodes themselves. These analogue signals are then routed through the onboard acquisition modules where they are converted to digital signal which ensures the greatest accuracy of the acquired signal.
For dual view systems there are two double set of photodiodes.

3.2. Control station

3.2.1. Control panel

The control panel has been designed and manufactured taking into consideration the specific operating conditions experienced during baggage checking. In particular, great attention has been paid to selecting the available functions displayed to ensure a user friendly operating experience with all the routinely used functions easily available. The display is focused on providing easy operational control together with a high standard of image presentation and interpretation.
Buttons for available functions are gathered together and highlighted to make access quick and easy.

3.2.2. LCD monitor

Two high quality monitors, standard on some systems, are provided for viewing the images obtained by the FEP ME, a monochromatic image is shown on the first monitor (giving morphological information on the content), while the colour image is displayed on the latter giving information on the type of material.
For dual view systems there are always two monitors that shows coloured image acquired from different positions, monochromatic images are shown reduced in box.

Figure 10 – Typical 2 monitor X-ray image by FEP ME 640: color and grey-scale view

Figure 11 – Typical single monitor X-ray image by FEP ME 640: colour view and grey-scale miniature

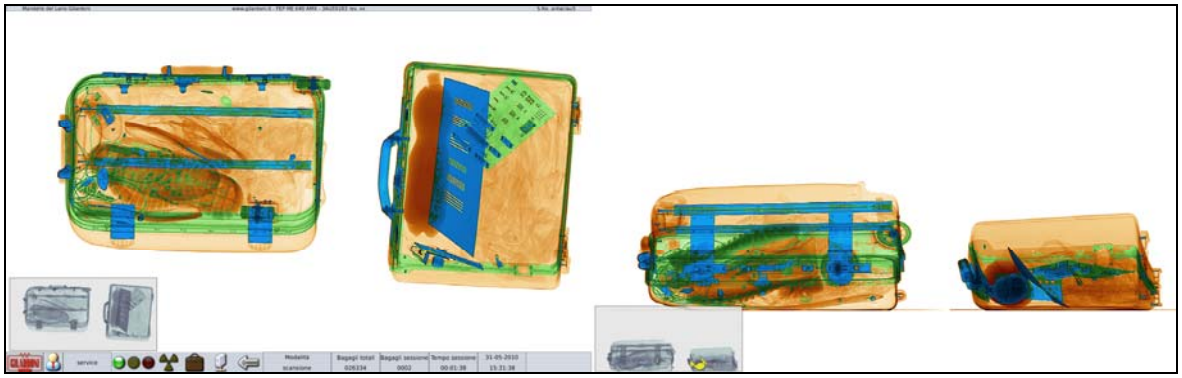


Figure 12 – Typical dual view x-ray image from FEP ME 640 AMX

3.3. Devices and accessories

- ADS
- TIP
- Network functionality: NetServer & TIPNet
- AIMS digital archiving
- AIMS Networking
- Modular rollers
- 2nd level search workstation
- UPS
- Login by smart card
- Local printer.
- Network printer.

3.4. Safety devices and self-diagnosis

To ensure the proper and reliable operation of the equipment it features:

- in the case of a conveyor stop or restart, a device that allows the equipment to automatically ensure a complete view of the luggage in the tunnel when the stop occurred.
- luggage release device which automatically activates when the luggage inside the tunnel is accidentally blocked against the ceiling or the wall of tunnel itself.
- Computer managed self-diagnosis system which displays on the monitor any faulty function by giving alarm messages, warnings or encoding abnormalities and explains to the user what to do.
- visual signal (led on the tunnel) when x-rays are emitted;
- safety buttons (on the tunnel and the panel) to stop the conveyor and x-ray emission:
- serial micro switches with emergency buttons to stop the conveyor and x-ray emission when the tunnel side fairings are removed.

The system consists of 3 levels of self-diagnosis:

- When the equipment is first switched on the system checks for correct operation of the machine components.
- During operation a system is installed on the machine to monitor the functionality of individual components and any faults or abnormalities will cause a fault message to be displayed. A watchdog monitoring system is also provided, transmitting signals which communicate information necessary to check that the program execution status is correct in any active units (this includes cross monitoring of program execution and the programmable unit status).
- When required, by using the support menu provided, special diagnostic tests can be performed to define the efficiency status of the system.

In the system, any faults are managed by the hardware, with a redundancy system on in place for hardware solutions. The software is only used for monitoring the safety status required for the machine and, in the case of a fault, providing the user with the relevant fault diagnosis.

4. Radioprotection

The equipment was designed and manufactured to meet the Italian and international standards on ionizing radiation to ensure safe environmental conditions for both personnel in charge of the equipment and also passengers or other employees in the vicinity.

The problem of protecting camera films, food, medicines, magnetic tapes and discs located inside the baggage has been solved by minimizing the exposure dosages experienced by the baggage transiting through the machine.

4.1. Standards

The Italian reference law on ionizing radiations is expressed by law decree no. 230 dated 17/3/1995 (enforced on 1-1-1996) and application decrees issued and published in law decree no. 241/00: it is specifically set that exposed workers in category A or B receive a dosage lower than 20 mSv/year (2 rem/year), while for uncontrolled generic population, possibly standing close to equipment, this dosage must be limited to 0.1 rem/year (1 mSv/year).
Thus in order to have operators considered as belonging to uncontrolled generic population, the annual dosage received by operators in all accessible areas surrounding the appliance must be lower than 1 mSv (0.1 rem).

4.2. Protection against FEP ME radiations

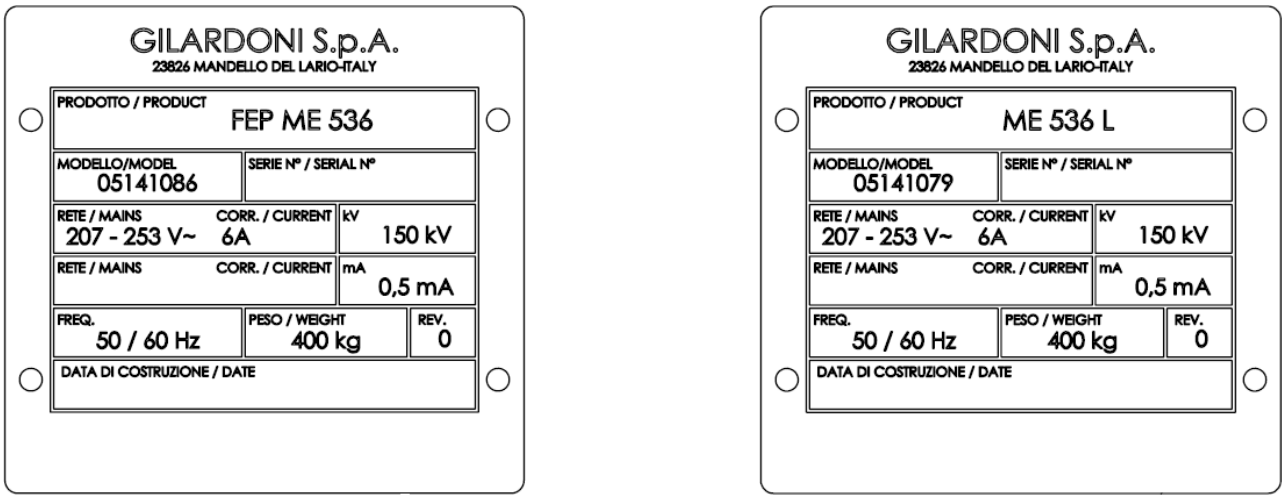
To maximize protection of both operators and personnel standing close to the x-ray zone, the equipment is fully protected and the average dosage detected close to the outer walls is lower than 1 µSv/h (0.1m rem/h).
In order to prevent any reduction in protection, all lead panels can only be removed by using specific tools.
On the tunnel inlet and outlet where the test is made, anti-X rubber curtains have been installed. Once the luggage has passed through they close to ensure integral protection.

5. Characteristics

5.1. FEP ME 536

Power supply	Single-phase 230 V +/- 10% - 50/60 Hz +/- 3 Hz; 1400 VA
Max luggage dimensions	50cm wide – 36cm high – unlimited length
Conveyor speed	0.2 m/sec
Conveyor direction	Double direction
RX generator	High-frequency monoblock (75 kHz)
Voltage to RX tube	150 kV dc
Current to RX tube	0.5 mA
Detectors	768 photodiodes, on two sets
Video presentation	1 or 2 LCD monitor
Electronic zoom	Continuous up to x64 with rotozoom
Leakage dose at 10 cm	≤ 1 µSv/h (0.1 mrem/h)
Resolution	38 AWG guaranteed, 41 AWG typical
Penetration	30mm steel guaranteed, 32mm steel typical
Operation	24 hours a day
Operating temperature	0° ÷ +40° C
Humidity	95% without condensate
Storage conditions	-20° ÷ +60° C, in closed and dry place
Inspection unit weight	300 kg
Overall dimensions	View Figure 22

The system identification plate is shown below:



For “French” version

Figure 13 – Identification plate of FEP ME 536 system

5.2. FEP ME 640

Power supply	Single-phase 230 V +/- 10% - 50/60 Hz +/- 3 Hz; 1400 VA
Max luggage dimensions	60cm wide – 40cm high – Unlimited length
Conveyor speed	0.2 m/sec
Conveyor direction	Double direction
RX generator	High-frequency monoblock (75 kHz)
Voltage to RX tube	150 kV dc
Current to RX tube	0.5 mA
Detectors	1152 photodiodes, on two sets
Video presentation	1 or 2 LCD monitor
Electronic zoom	Continuous up to x64 with rotozoom
Leakage dose at 10 cm	≤ 1 µSv/h (0.1 mrem/h)
Resolution	40 AWG guaranteed, 41 AWG typical
Penetration	32mm steel guaranteed, 34mm steel typical
Operation	24 hours a day
Operating temperature	0° ÷ +40° C
Humidity	95% without condensate
Storage conditions	-20° ÷ +60° C, in closed and dry place
Inspection unit weight	450 kg
Control station weight	30 kg
Overall dimensions	View Figure 23

Some examples of system identification plate are shown below:

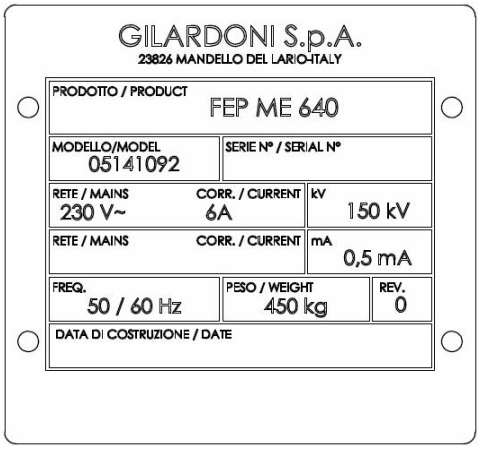


Figure 14 – Identification plate of FEP ME 640 system

5.3. FEP ME 640 EK07

Please refer to FEP ME 640 06 version User Manual.

5.4. FEP ME 640 LP

Power supply	Single-phase 230 V +/- 10% - 50/60 Hz +/- 3 Hz; 1400 VA
Max luggage dimensions	60cm wide – 40cm high – Unlimited length
Conveyor speed	0.2 m/sec
Conveyor direction	Double direction
RX generator	High-frequency monoblock (75 kHz)
Voltage to RX tube	150 kV dc
Current to RX tube	0.5 mA
Detectors	896 photodiodes, on two sets
Video presentation	1 or 2 LCD monitor
Electronic zoom	Continuous up to x64 with rotozoom
Leakage dose at 10 cm	≤ 1 µSv/h (0.1 mrem/h)
Resolution	38 AWG guaranteed, 41 AWG typical
Penetration	30mm steel guaranteed, 32mm steel typical
Operation	24 hours a day
Operating temperature	0° ÷ +40° C
Humidity	95% without condensate
Storage conditions	-20° ÷ +60° C, in closed and dry place
Inspection unit weight	450 kg
Control station weight	30 kg
Overall dimensions	View Figure 23

Some examples of system identification plate are shown below:

Figure 15 – Identification plate of FEP ME 640 LP system

5.5. FEP ME 640 LP SA

Power supply	Single-phase 230 V +/- 10% - 50/60 Hz +/- 3 Hz; 1400 VA
Max luggage dimensions	60cm wide – 40cm high – Unlimited length
Conveyor speed	0.2 m/sec
Conveyor direction	Double direction
RX generator	High-frequency monoblock (75 kHz)
Voltage to RX tube	150 kV dc
Current to RX tube	0.5 mA
Detectors	896 photodiodes, on two sets
Video presentation	1 or 2 LCD monitor
Electronic zoom	Continuous up to x64 with rotozoom
Leakage dose at 10 cm	≤ 1 µSv/h (0.1 mrem/h)
Resolution	38 AWG guaranteed, 41 AWG typical
Penetration	30mm steel guaranteed, 32mm steel typical
Operation	24 hours a day
Operating temperature	0° ÷ +40° C
Humidity	95% without condensate
Storage conditions	-20° ÷ +60° C, in closed and dry place
Inspection unit weight	400 kg
Control station weight	----
Overall dimensions	View **Errore. L'origine riferimento non è stata trovata.**

The system identification plate is shown below:

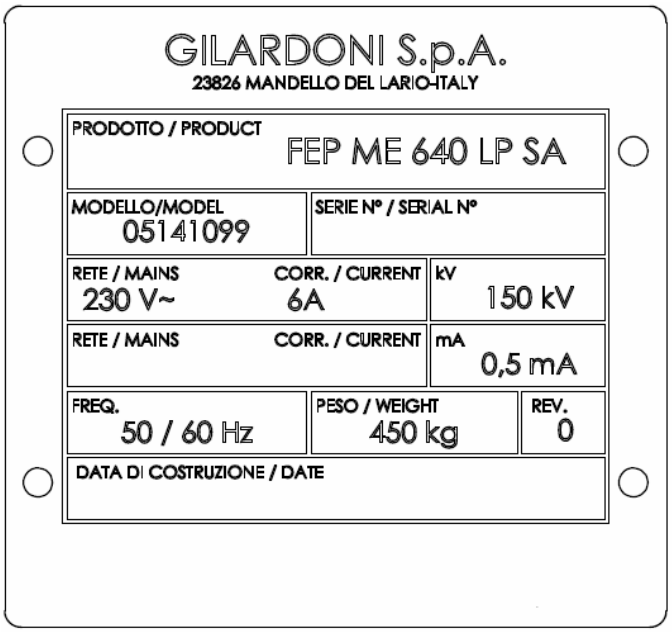
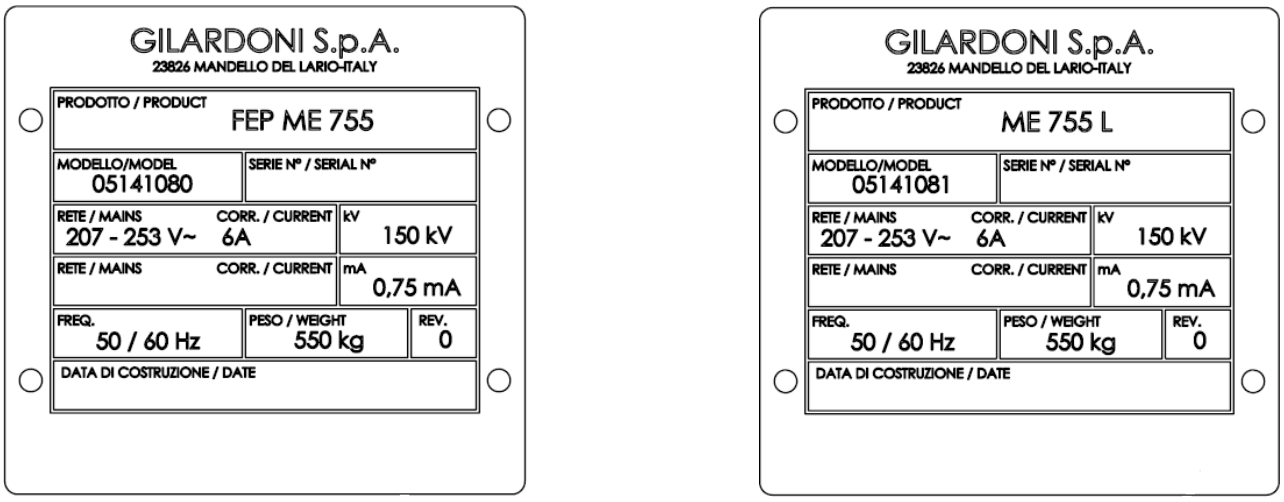


Figure 16 – Identification plate of FEP ME 640 LP SA system

5.6. FEP ME 755

Power supply	Single-phase 230 V +/- 10% - 50/60 Hz +/- 3 Hz; 1400 VA
Max luggage dimensions	75cm wide – 55cm high – Unlimited length
Conveyor speed	0.2 m/sec
Conveyor direction	Double direction
RX generator	High-frequency monoblock (30 kHz)
Voltage to RX tube	150 kV dc
Current to RX tube	0.7 mA
Detectors	1152 photodiodes, on two sets
Video presentation	1 or 2 LCD monitor
Electronic zoom	Continuous up to x64 with rotozoom
Leakage dose at 10 cm	≤ 1 µSv/h (0.1 mrem/h)
Resolution	38 AWG guaranteed, 41 AWG typical
Penetration	32mm steel guaranteed, 34mm steel typical
Operation	24 hours a day
Operating temperature	0° ÷ +40° C
Humidity	95% without condensate
Storage conditions	-20° ÷ +60° C, in closed and dry place
Inspection unit weight	580 kg
Control station weight	30 kg
Overall dimensions	View Figure 26

The system identification plate is shown below:



For “French” version

Figure 17 – Identification plate of FEP ME 755 system

5.7. FEP ME 975 HC

Power supply	Single-phase 230 V +/- 10% - 50/60 Hz +/- 3 Hz; 2000 VA
Max luggage dimensions	90cm wide – 75cm high – Unlimited length
Conveyor speed	0.2 m/sec
Conveyor direction	Double direction
RX generator	High-frequency monoblock (75 kHz)
Voltage to RX tube	160 kV dc
Current to RX tube	1.5 mA
Detectors	1536 photodiodes, on two sets
Video presentation	1 or 2 LCD monitor
Electronic zoom	Continuous up to x64 with rotozoom
Leakage dose at 10 cm	≤ 1 µSv/h (0.1 mrem/h)
Resolution	38 AWG guaranteed, 41 AWG typical
Penetration	33mm steel guaranteed, 35mm steel typical
Operation	24 hours a day
Operating temperature	0° ÷ +40° C
Humidity	95% without condensate
Storage conditions	-20° ÷ +60° C, in closed and dry place
Inspection unit weight	800 kg
Control station weight	30 kg
Overall dimensions	View **Errore. L'origine riferimento non è stata trovata.**

The system identification plate is shown below:

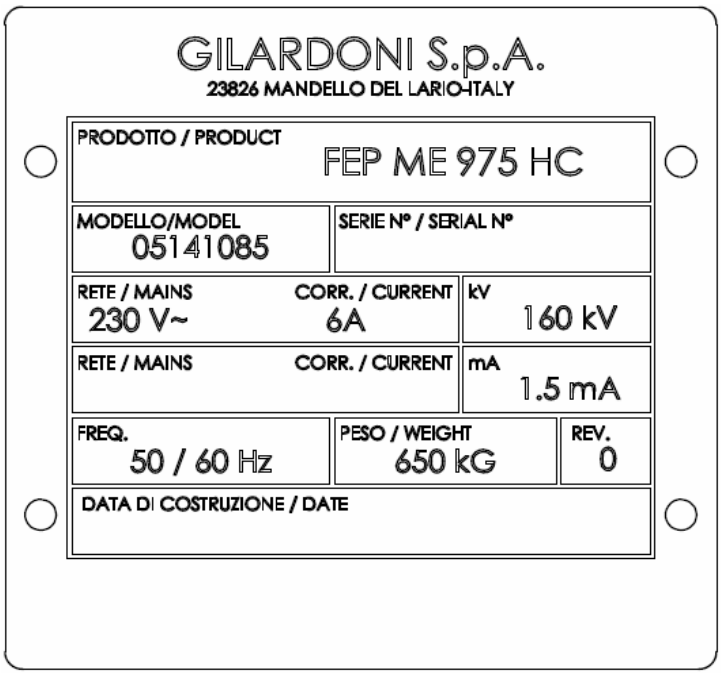
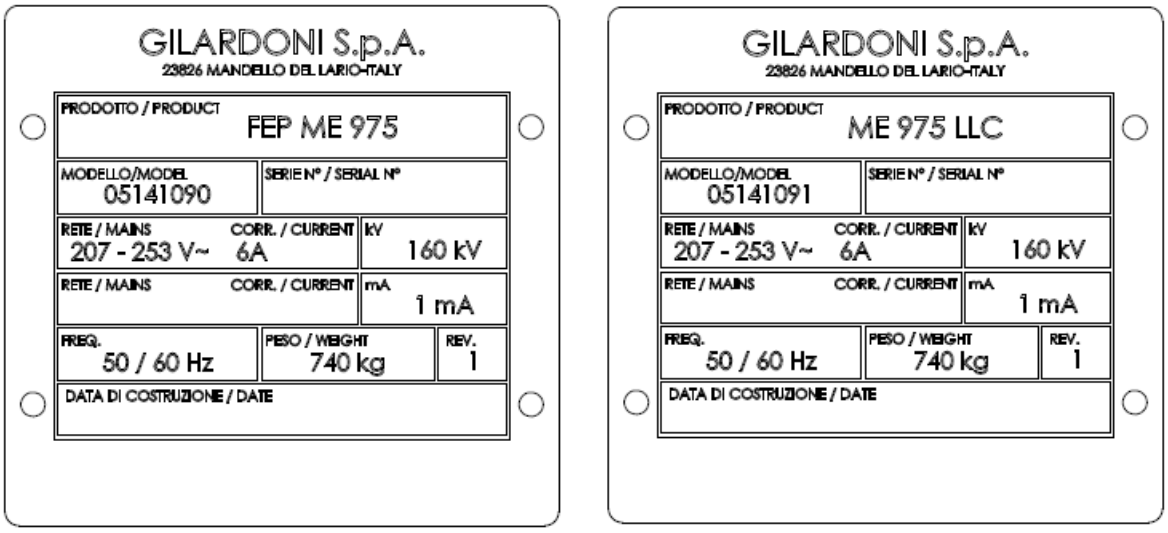


Figure 18 – Identification plate of FEP ME 975 HC system

5.8. FEP ME 975

Power supply	Single-phase 230 V +/- 10% - 50/60 Hz +/- 3 Hz; 2000 VA
Max luggage dimensions	90cm wide – 75cm high – Unlimited length
Conveyor speed	0.2 m/sec
Conveyor direction	Double direction
RX generator	High-frequency monoblock (75 kHz)
Voltage to RX tube	160 kV dc
Current to RX tube	1.0 mA
Detectors	1664 photodiodes, on two sets
Video presentation	1 or 2 LCD monitor
Electronic zoom	Continuous up to x64 with rotozoom
Leakage dose at 10 cm	≤ 1 µSv/h (0.1 mrem/h)
Resolution	38 AWG guaranteed, 41 AWG typical
Penetration	33mm steel guaranteed, 35mm steel typical
Operation	24 hours a day
Operating temperature	0° ÷ +40° C
Humidity	95% without condensate
Storage conditions	-20° ÷ +60° C, in closed and dry place
Inspection unit weight	800 kg
Control station weight	30 kg
Overall dimensions	View Figure 28

The system identification plate is shown below:



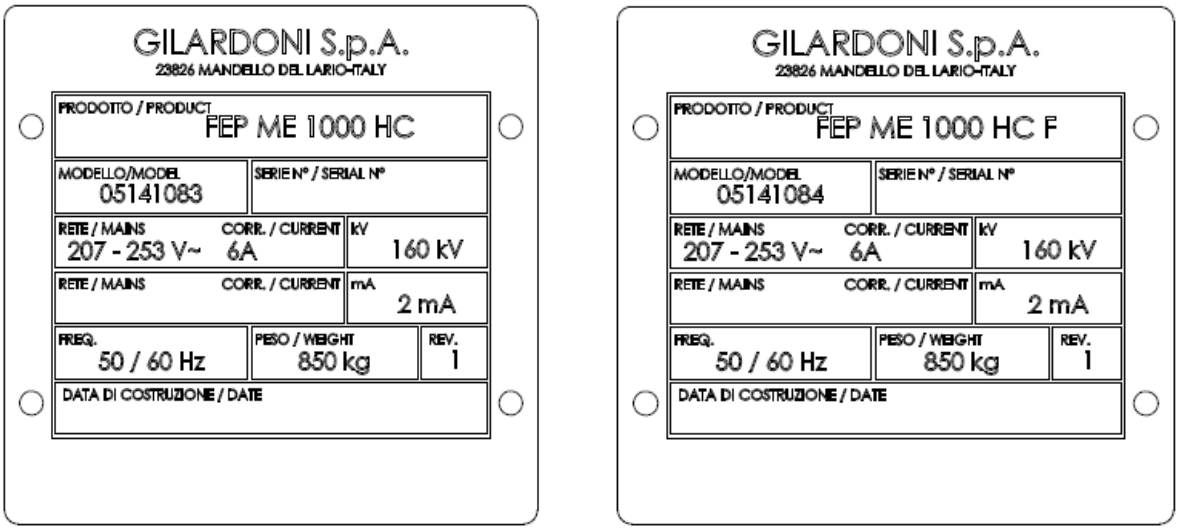
For “French” version

Figure 19 – Identification plate of FEP ME 975 system

5.9. FEP ME 1000 HC

Power supply	Single-phase 230 V +/- 10% - 50/60 Hz +/- 3 Hz; 1400 VA
Max luggage dimensions	100cm wide – 100cm high – Unlimited length
Conveyor speed	0.2 m/sec
Conveyor direction	Double direction
RX generator	High-frequency monoblock (75 kHz)
Voltage to RX tube	160 kV dc
Current to RX tube	2.0 mA
Detectors	1792 photodiodes, on two sets
Video presentation	1 or 2 LCD monitor
Electronic zoom	Continuous up to x64 with rotozoom
Leakage dose at 10 cm	≤ 1 µSv/h (0.1 mrem/h)
Resolution	38 AWG guaranteed, 41 AWG typical
Penetration	35mm steel guaranteed, 37mm steel typical
Operation	24 hours a day
Operating temperature	0° ÷ +40° C
Humidity	95% without condensate
Storage conditions	-20° ÷ +60° C, in closed and dry place
Inspection unit weight	850 kg
Control station weight	30 kg
Overall dimensions	View Figure 29

The system identification plate is shown below:



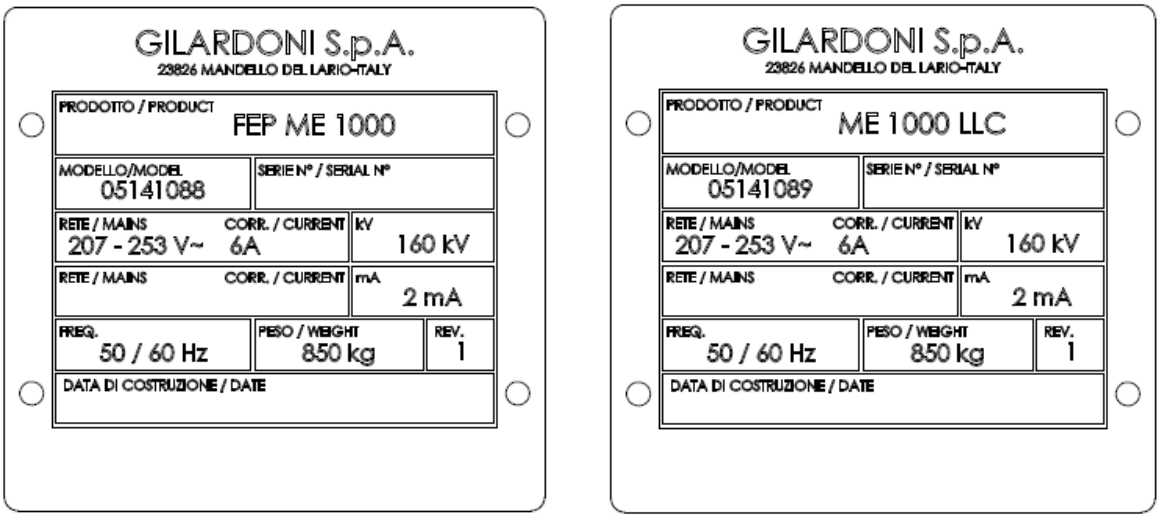
For “French” version

Figure 20 – Identification plate of FEP ME 1000 HC system

5.10. FEP ME 1000

Power supply	Single-phase 230 V +/- 10% - 50/60 Hz +/- 3 Hz; 2000 VA
Max luggage dimensions	100cm wide – 100cm high – Unlimited length
Conveyor speed	0.2 m/sec
Conveyor direction	Double direction
RX generator	High-frequency monoblock (75 kHz)
Voltage to RX tube	160 kV dc
Current to RX tube	2.0 mA
Detectors	1920 photodiodes, on two sets
Video presentation	1 or 2 LCD monitor
Electronic zoom	Continuous up to x64 with rotozoom
Leakage dose at 10 cm	≤ 1 µSv/h (0.1 mrem/h)
Resolution	38 AWG guaranteed, 41 AWG typical
Penetration	33mm steel guaranteed, 35mm steel typical
Operation	24 hours a day
Operating temperature	0° ÷ +40° C
Humidity	95% without condensate
Storage conditions	-20° ÷ +60° C, in closed and dry place
Inspection unit weight	850 kg
Control station weight	30 kg
Overall dimensions	View Figure 30

The system identification plate is shown below:



For “French” version

Figure 21 – Identification plate of FEP ME 1000 system

5.11. Appearance and dimensions of FEP ME 536

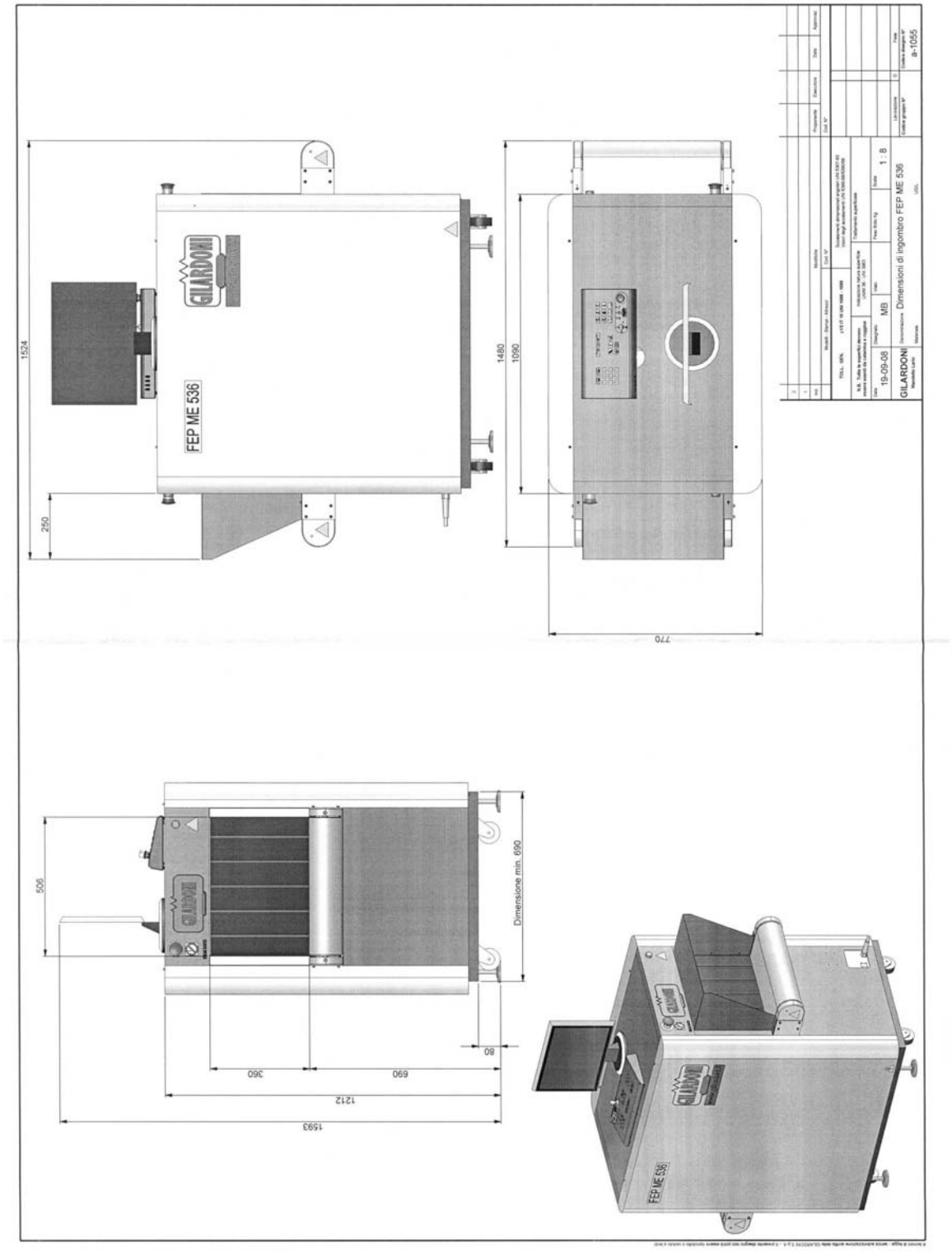


Figure 22 – Appearance and dimensions of FEP ME 536

5.12. Appearance and dimensions of FEP ME 640/640 LP

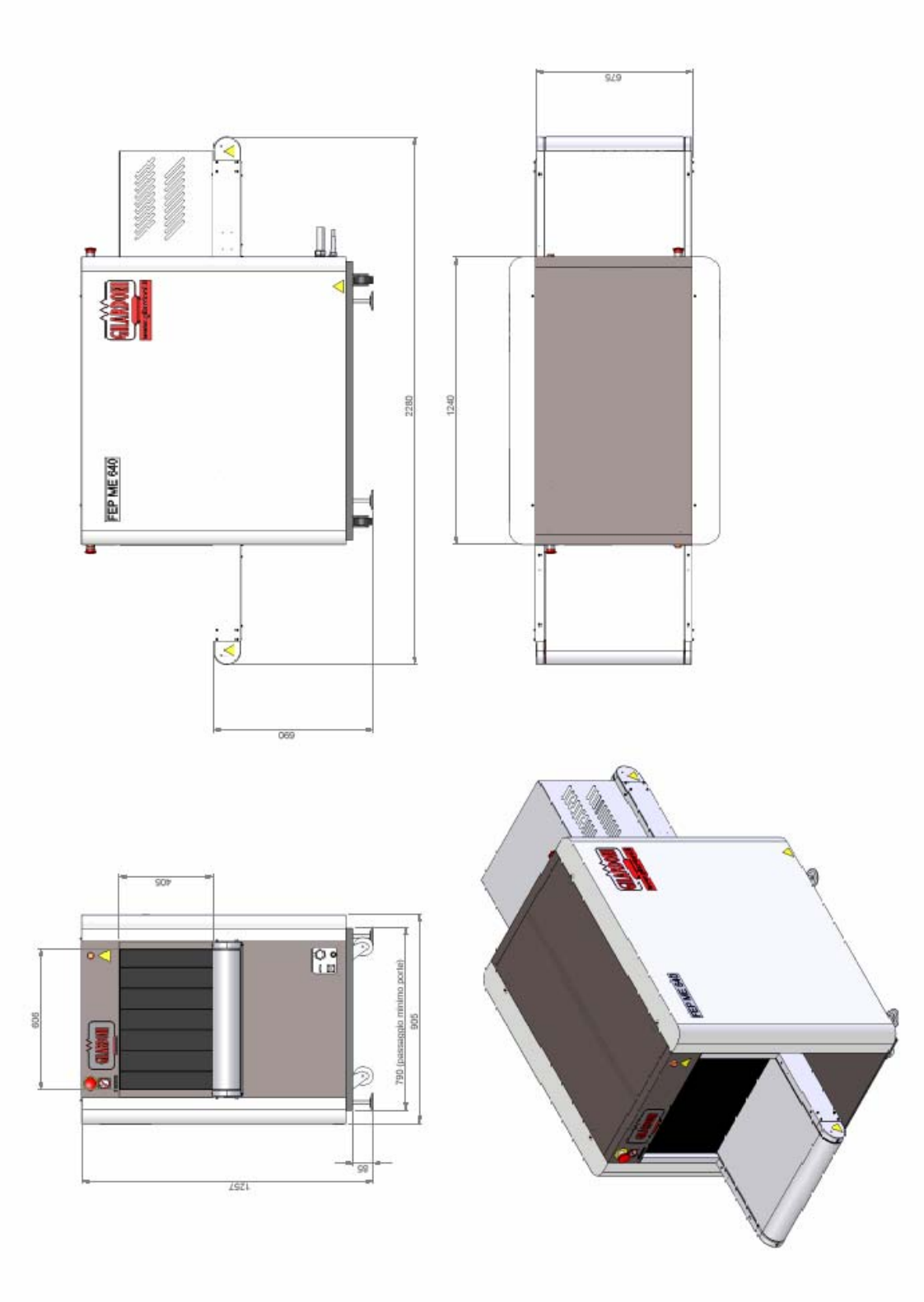


Figure 23 – Appearance and dimensions of FEP ME 640/640 LP

There is a particular configuration of the FEP ME 640 called "Navy" (Figure 24) which is characterized by the compact design, the easy portability with roller luggage unloading connected, the lack of table control station with console and monitors on the top of the plant. Functionality is identical to that of the standard version.

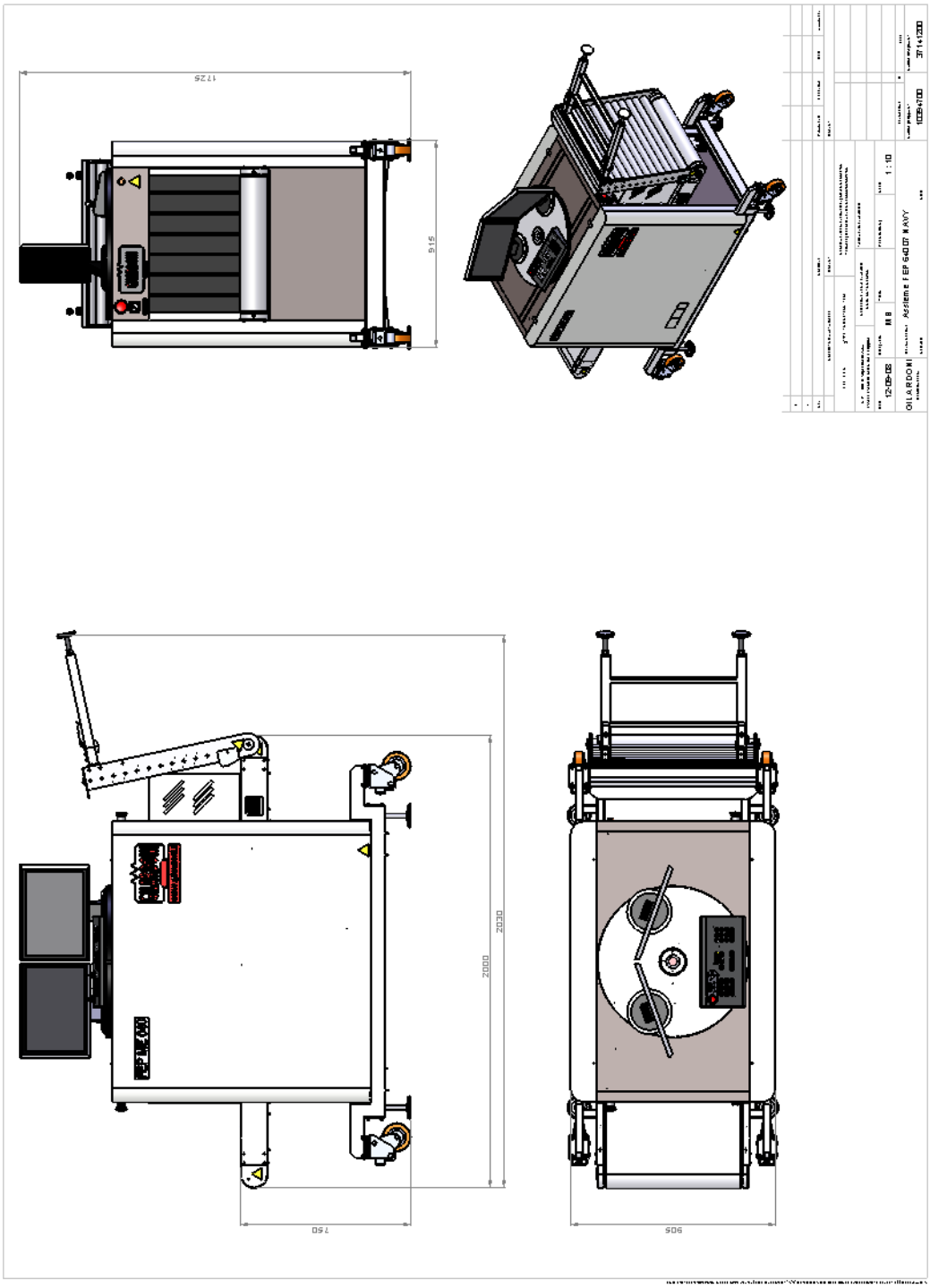


Figure 24 – Appearance and dimensions of FEP ME 640 “Navy”

5.13. Appearance and dimensions of FEP ME 640 EK07

Please refer to FEP ME 640 06 version User Manual.

5.14. Appearance and dimensions of FEP ME 640 LP SA

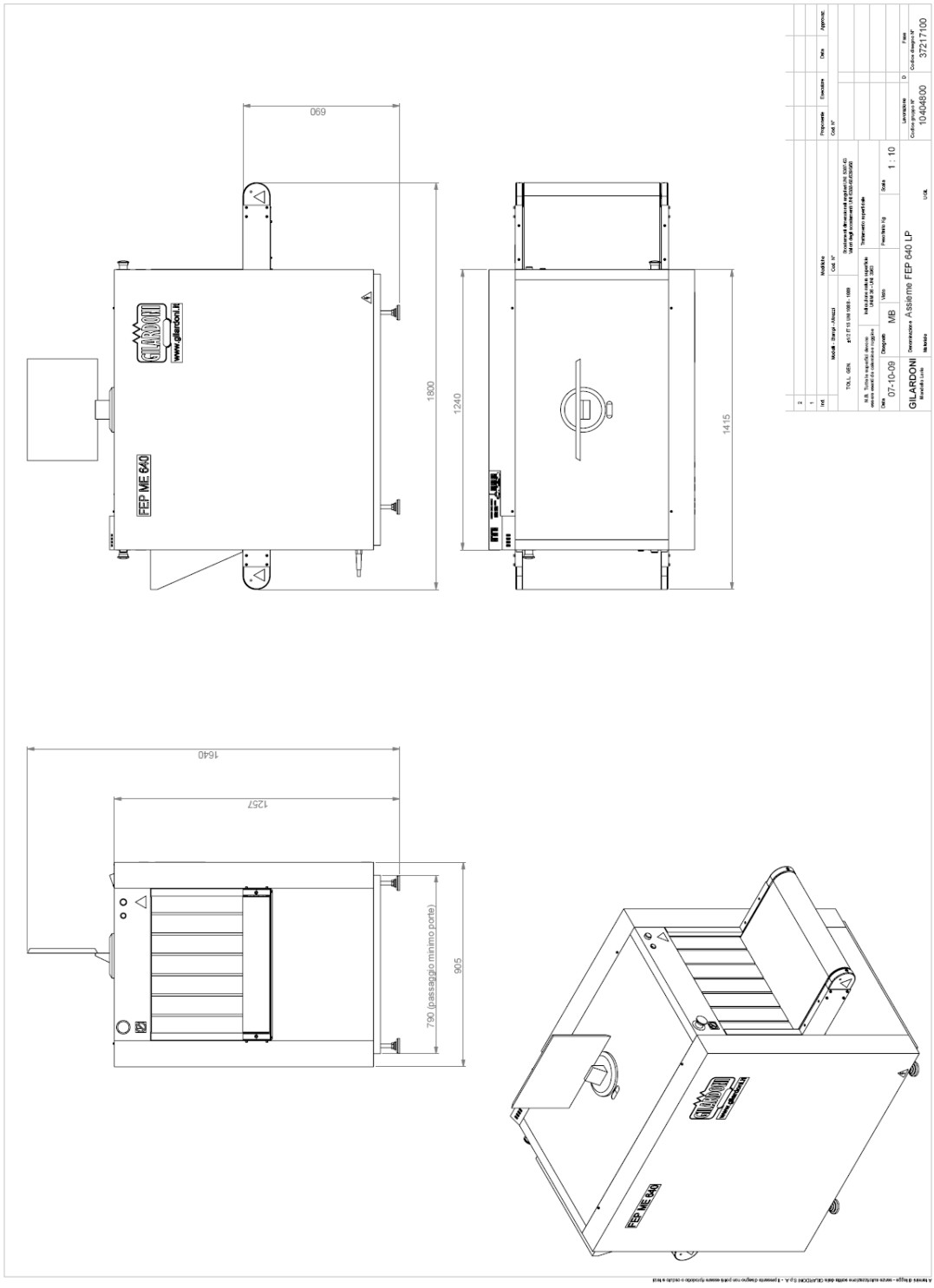


Figure 25 – Appearance and dimensions of FEP ME 640 LP SA

5.15. Appearance and dimensions of FEP ME 755

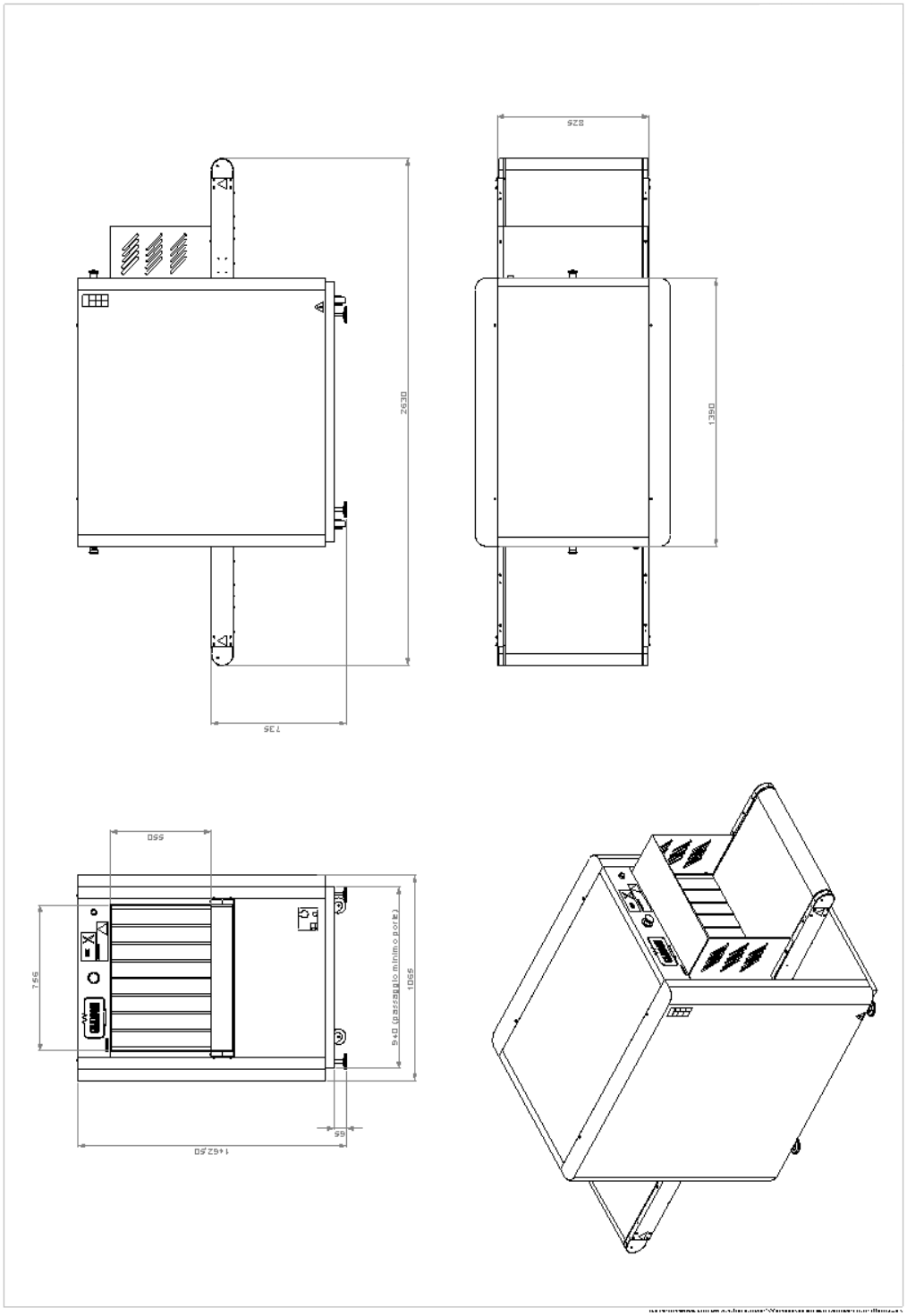


Figure 26 – Appearance and dimensions of FEP ME 755

5.16. Appearance and dimensions of FEP ME 975 HC

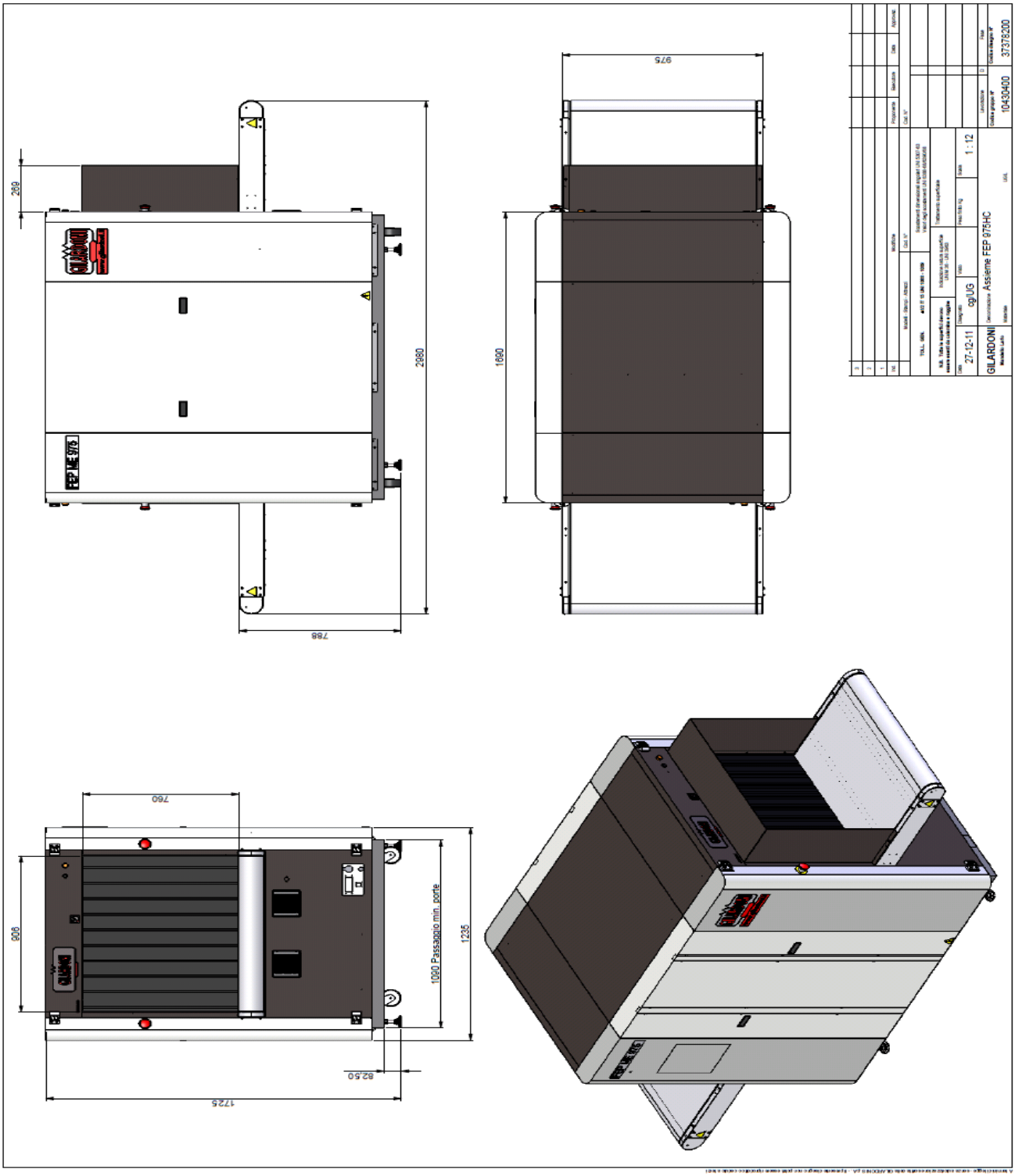


Figure 27 – Appearance and dimensions of FEP ME 975 HC

5.17. Appearance and dimensions of FEP ME 975

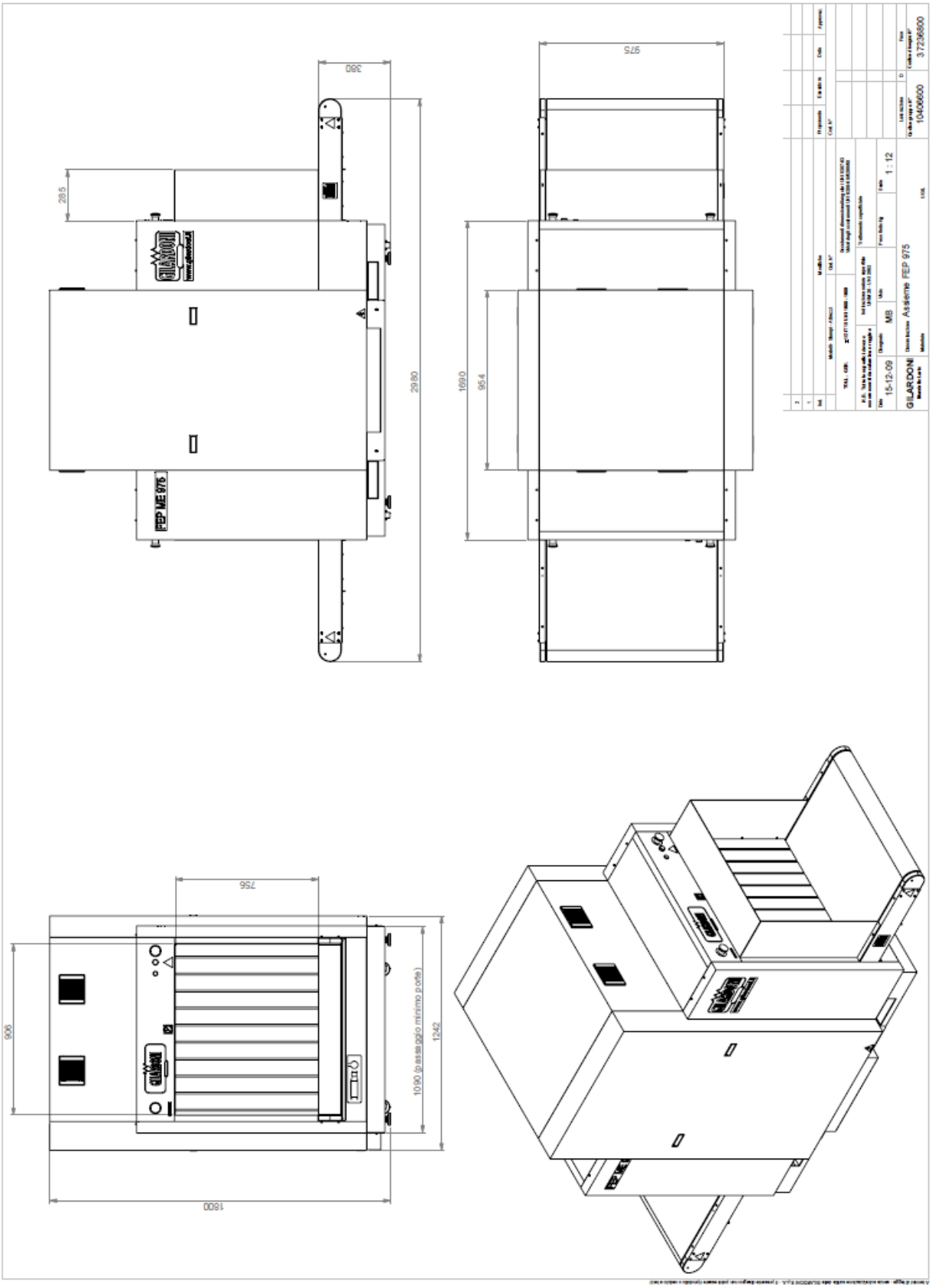


Figure 28 – Appearance and dimensions of FEP ME 975

5.18. Appearance and dimensions of FEP ME 1000 HC

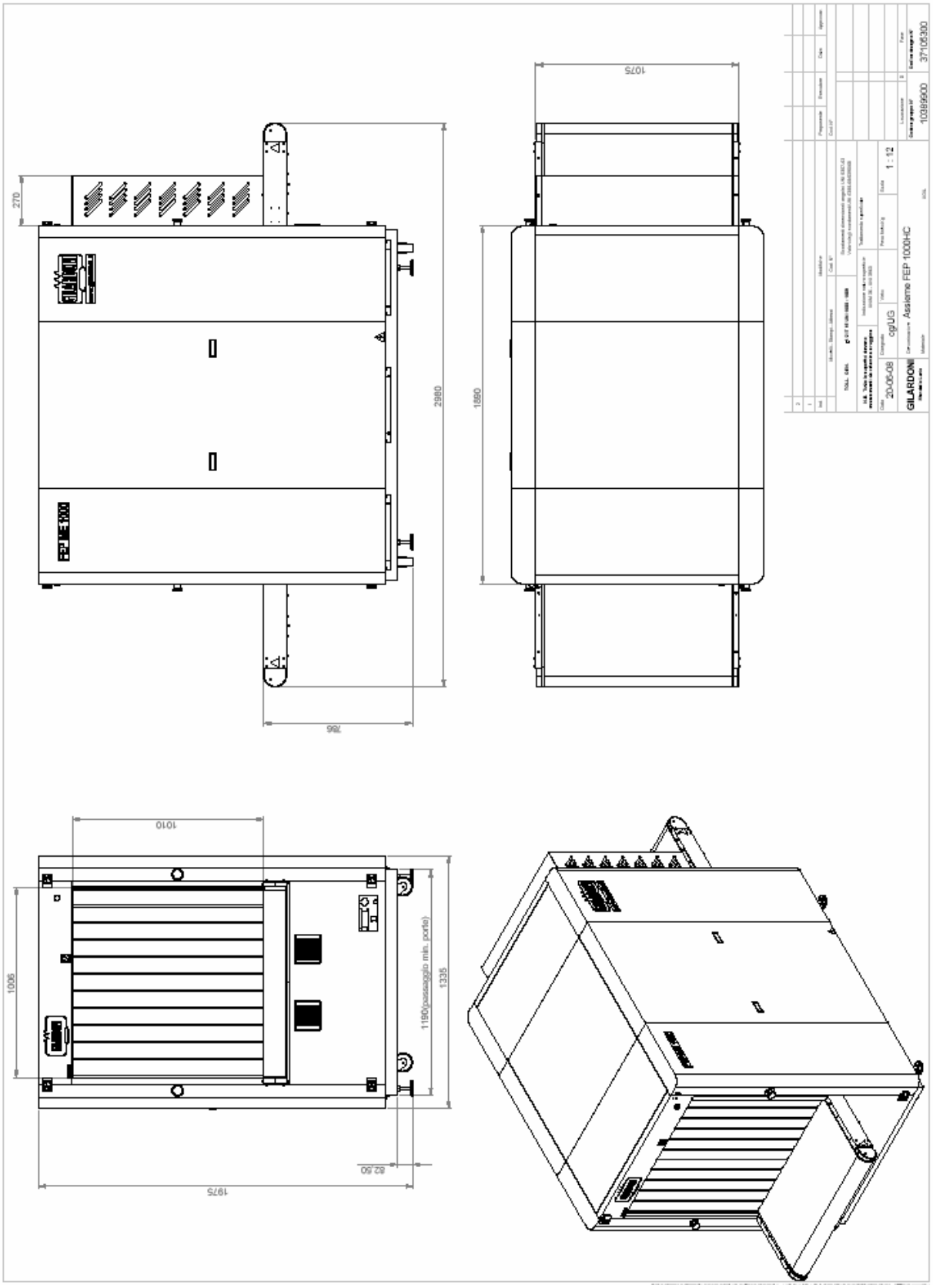


Figure 29 – Appearance and dimensions of FEP ME 1000 HC

5.19. Appearance and dimensions of FEP ME 1000

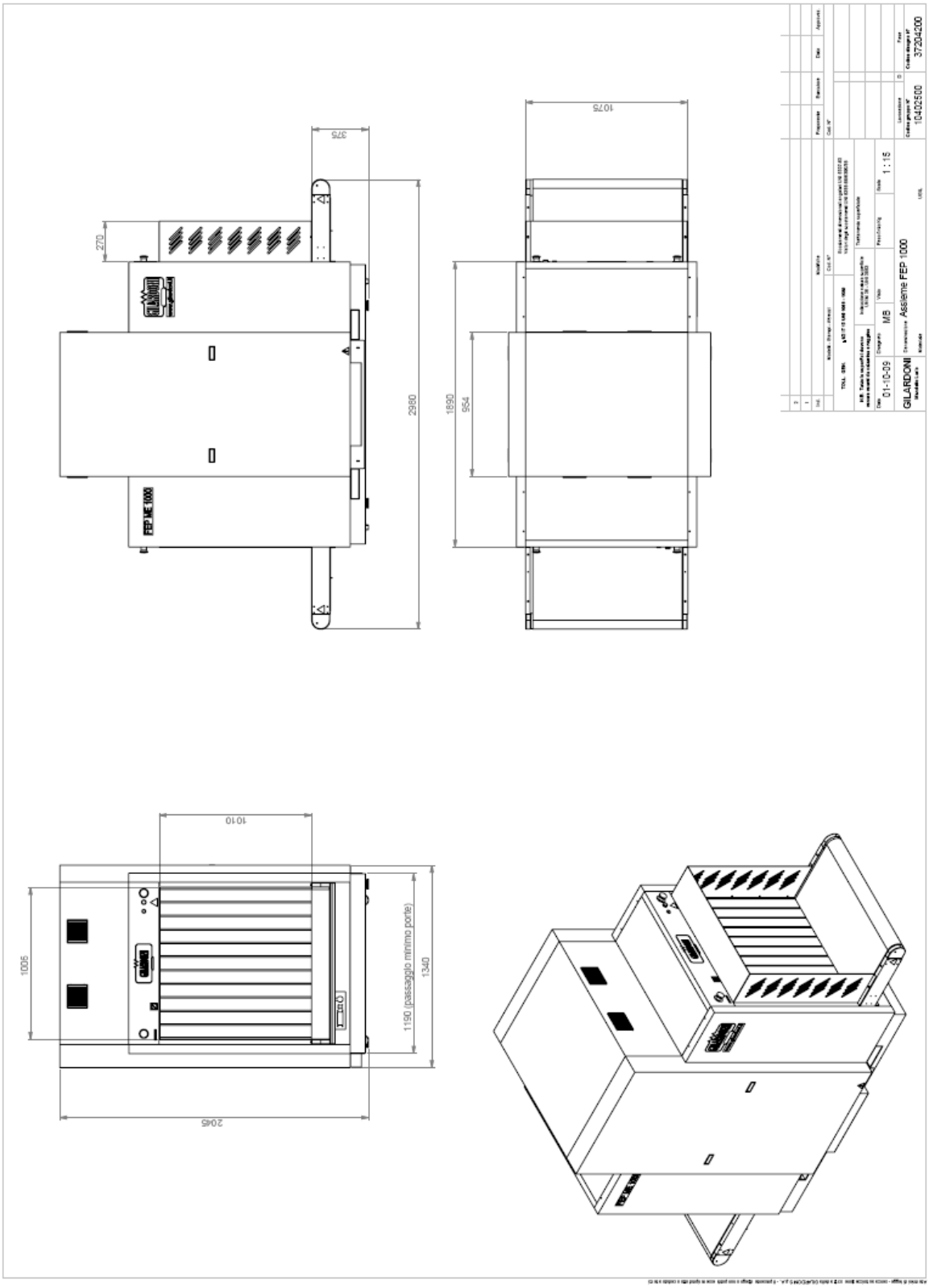


Figure 30 – Appearance and dimensions of FEP ME 1000

6. User instructions

The man-machine interface consists of a keyboard panel and 1 or 2 monitors.

6.1. Control and command panel for FEP ME

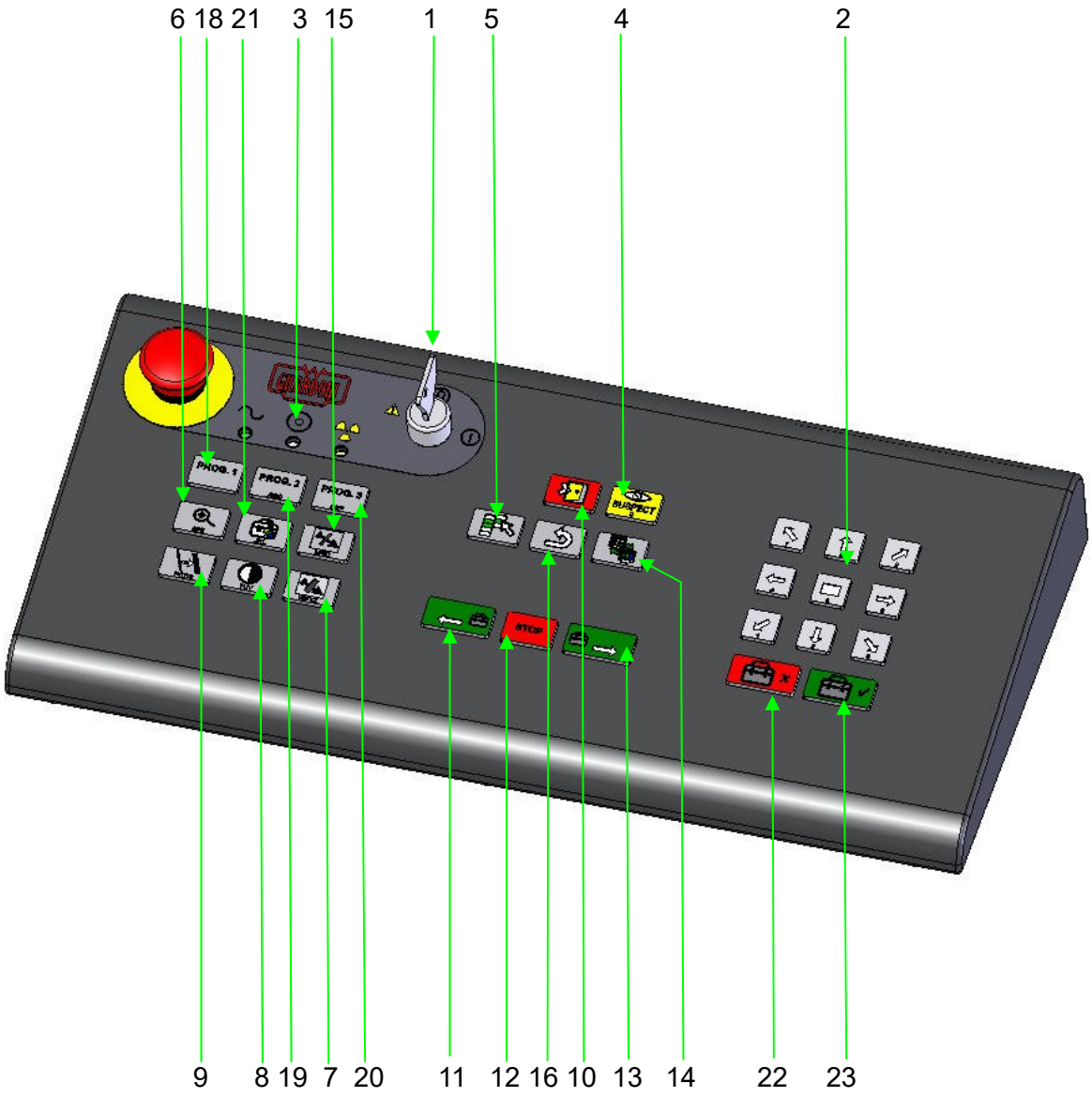


Figure 31 – FEP ME panel

1 Key switch: Enables the system to be switched on and off.

2 "**ZOOM**" position keyboard: Enables positioning of the zoom window

3 "Ready / Malfunction" LED: The red LED lights up in case of a malfunction; if no Malfunction occurs and machine is ready to operate, the LED is green.

	“Power supply on” LED: The green LED lights up when the system is connected to the power supply network. “X-ray emission” LED: The yellow LED lights up when X-rays are emitted.
4 “**SUSPECT**” button:	to be used when a FTI has supposedly been inserted into the luggage.
5 “**SELECT**” button:	it allows access and enables selection of the functions menu on the monitor.
6 “**ZOOM**” button:	it activates the zoom function on the displayed Image (see also Zooming on a baggage area)
7 “**HIGH PENETRATION**” button:	High penetration (High Energy) for an excellent display of large thicknesses.

8 “**OPTIMUM CONTRAST**” button: it helps find the best contrast balance considering the image displayed (see also Excellent contrast).

9 “**FILTER**” button:	it increases the visibility of item edges (see Edge enhancement filter).
10 “**LOG OUT**” button:	it closes the working session (see also LOGOUT).
11 “**LEFT**” button:	it moves the conveyor to the direction shown by arrow; together with STOP key, it allows for RAM navigation
12 “**STOP**” button:	it stops the conveyor
13 “**RIGHT**” button:	it moves the conveyor to the direction shown by arrow; together with STOP key, it allows for RAM navigation
15 “**LOW PENETRATION**” button:	excellent display for small thicknesses
14 “**B/W-COL**” button:	if the system is configured for a single monitor, pressing this button will alternate the display between a colour or monochrome image; if 2 monitors are configured, an image ‘switch’ is performed.
16 “**RESET**” button:	allows a user to restore previous or the original image viewed (see also Post-processing deactivation)
18 “**PROG1**” button:	PROG keys on the panel allow activation and deactivation of the post-processing composition, previously set up by operator. The administrator can decide whether or not these keys can be programmed and set up specific actions or filters series. Activation and deactivation operation of these post-processing macros is similar to the

	others, except for the lack of any step in circulation operation mode, but status switching only.
20 “**PROG2, 3**” button:	see PROG1
21 “**ENERGY STRIPPING**” button:	it allows the display of single types of material families on the colour image).
22 “**REJECT**” button:	it allows warning on “dangerous” luggage
23 “**CLEAR**” button:	it allows warning on “clean” luggage

6.2. Control and command panel for FEP ME Evolution Kit 07 (EK07)

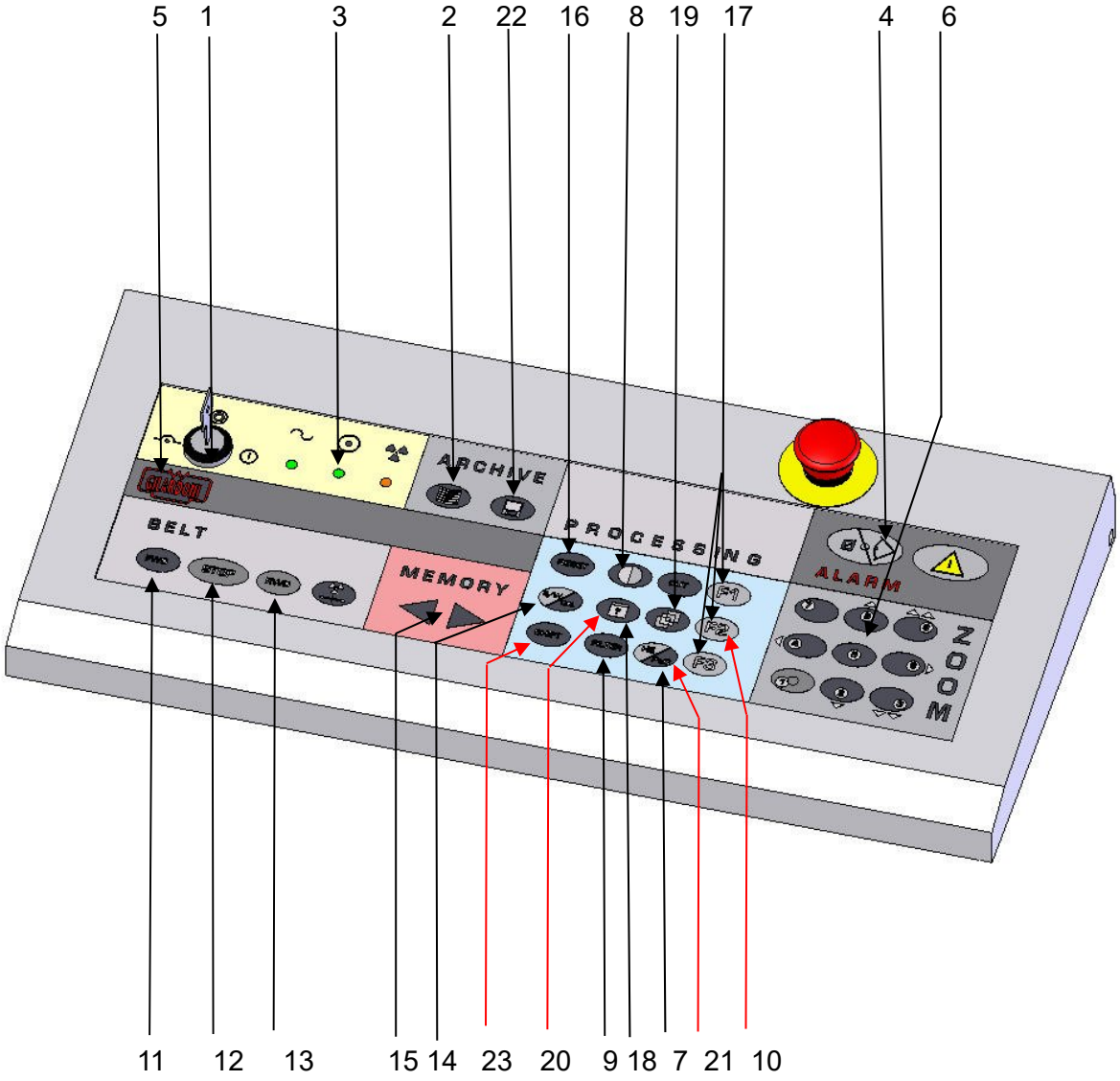


Figure 32 – FEP ME EK07

1 Key switch: Enables the system to be switched on and off.

2 **"SESSION RECALL"** button: Enables the revision of previous working sessions when the machine is not in scanning mode.

3 "Malfunction" warning light: power supply – green LED present green LED ready - yellow LED for ray emission - red LED lights up in case of malfunction.

3 "Ready / Malfunction" LED: refer to monitor LEDs: red LED lights up in case of malfunction; if no malfunction occurs and machine is ready to operate, the LED is green.

"Power supply on" LED: refer to monitor LEDs: green LED lights up when the system is connected to power supply network.

"X-ray emission" LED:	refer to monitor LEDs: yellow LED lights when X-rays are emitted.
4 "**SUSPECT**" button:	to be used when a FTI has supposedly been inserted into the luggage.
5 "**SELECT**" button:	it allows access and enables selection of the functions menu on the monitor.
6 "**ZOOM**" button:	it activates the zoom function on the displayed image (see also Zooming on a baggage area)
7 "**HIGH PENETRATION**" button:	High penetration (High Energy) for an excellent display for largr thicknesses
8 "**EXCELLENT CONTRAST**" button:	it helps find the best contrast balance considering the image displayed (see also Excellent contrast).
9 "**FILTER**" button:	it increases the visibility of item edges (see Edge enhancement filter).
10 "**F2**" and "**SHIFT"** buttons:	LOGOUT function: it closes the working session.
11 "**LEFT**" button:	it moves the conveyor in the direction shown by the arrow
12 "**STOP**" button:	it stops the conveyor
13 "**RIGHT**" button:	it moves the conveyor in the direction shown by the arrow
14 "**B/W-COL**" button:	if the system is configured for a single monitor, pressing this button will alternate the display between a colour or monochrome image; if 2 monitors are configured, an image 'switch' is performed.
15 "**ARROW**" button:	horizontal arrows for RAM navigation
16 "**RESET**" button:	allows a user to restore previous or the original image viewed (see also Post-processing deactivation)
17 "PROG1" "PROG1" "PROG2" "PROG3"	buttons: PROG keys on the panel allow activation and deactivation of post-processing composition previously set up by an operator. The administrator can decide whether or not these keys can be programmed and set up specific actions or filters series. Activation and deactivation operation of these post-processing macros is similar to the others, except for the lack of any step in circulation operation mode, but status switching only.
18 "**?**" button:	it allows the alarm display to be hidden.

19 “**ENERGY STRIPPING**” button:	it enables the display of single types of material families on the colour image.
20 “**SHIFT**” and ”**?**” buttons:	they enable activation of a negative image
21 “**SHIFT**” and ”**HE/PsC**” buttons:	they enable the display of a pseudo colour image
22 “**SAVE IMAGE**”:	it enables the image currently existing on the screen to be saved.
23 “**SHIFT**” button:	it allows activation of other functions when combined with other keys (shown with red arrows in figure)

6.3. User instructions

Typical tasks undertaken by an operator when using the system are described below.

Warning:
During system switch on and the testing phase, X-ray emission is activated (shown by a yellow warning light illuminating on the system). For safety reasons an operator must always be present during X-ray emission and while the conveyor is moving.

There is no requirement for a predetermined operator position with respect to the inspection unit; but it is recommended that the control station is located about 2 metres from the inspection unit at its side.

The control station must be located so that operator in charge has a complete view of the inspection unit and all the personnel in close proximity to the unit.

6.3.1. Messages

All messages have their own coding and are divided into four separate categories:

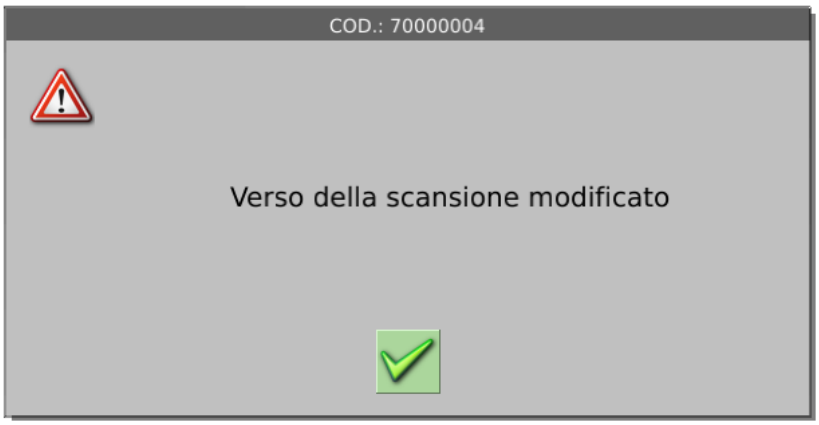


Figure 33 – Warning message

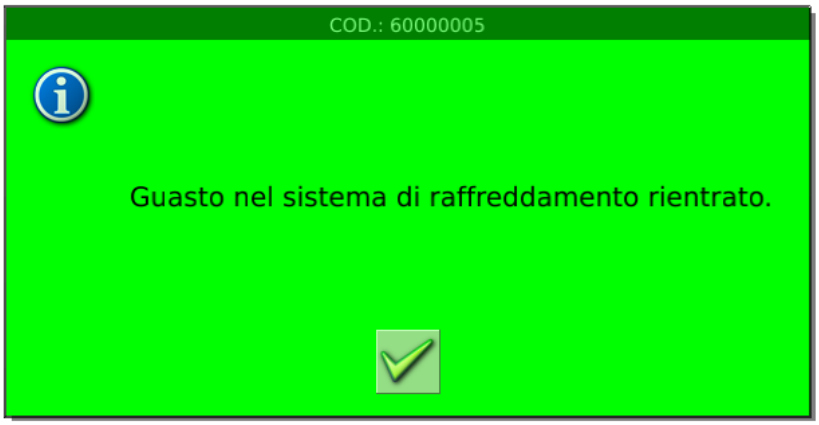


Figure 34 – Error solution message

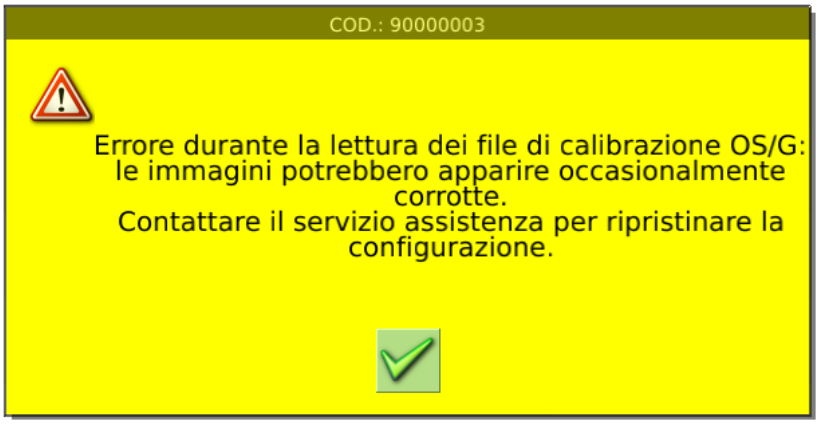


Figure 35 – Malfunction warning message

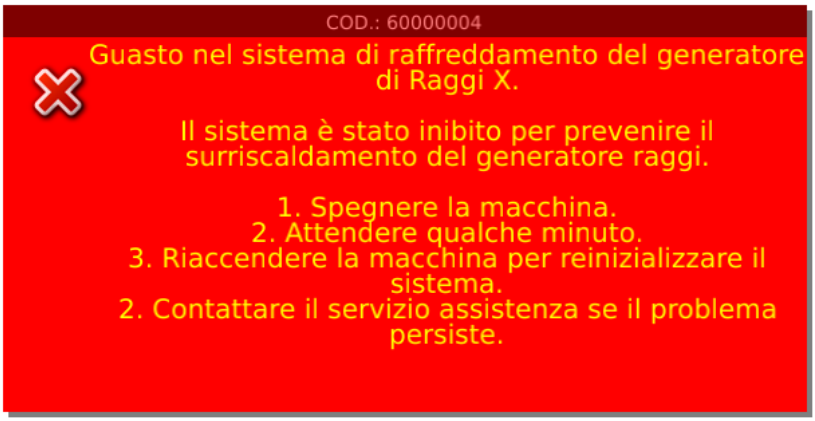


Figure 36 – Critical error message

Messages Mxxx: they indicate a “help dialog”, highlighting main machine events. When special situations occur, where communication is needed between the machine and the operator, the machine communicates messages via pop ups to streamline the machine-user interaction. These messages do not refer to critical information or actions, for either the user or the system. Messages are not generated when the machine is scanning, to prevent an incorrect image being displayed.
The message remains displayed until removed by the operator’s action.
Messages can be removed by pressing the RESET (or any) button.

Warning Wxxx: they show an abnormality which does not block operations performed by the machine. The message must be removed by the operator in order to continue, any other warning message is managed in a queue.
When “WARNING” occurs the system displays the relevant messages (red writing on a yellow background).
The message identifies WARNING text description, SSs involved, any alarm causes and recommended actions.
The message is only cancelled after being removed by the operator and the yellow status LED remains illuminated to highlight the WARNING having occurring. The LED remains illuminated until the machine is switched off and back on again.

Alarm Axxx: indicates an abnormality which is blocking operations being performed on the machine.
When a malfunction occurs, the system reaches the proper safety level, displaying the relevant alarm messages (yellow writing on a red background).

The message identifies the alarm text description, SSs involved, any causes of an alarm and recommended actions.
The alarm message remains displayed until removed by system reset.

Messages TIPxxx: indicates the operator's reaction type when a TIP event occurs, if TIP functionality is activated, see manual on TIP function.

6.3.2. Switching on the System

Check that the green pilot light close to the key switch is illuminated, otherwise refer to the troubleshooting chapter.
Rotate the key switch clockwise on the panel, to position 1.
Wait during the system initialization phase, including the Operating System start of the machine management programs and self-diagnostic phase; these operations are usually performed in less then two minutes.

When the switch on procedure is completed, the access authentication screen appears (login).

6.3.3. LOGIN phase

Access to the machine functions is only allowed after user authentication is completed by entering a USER ID and a PASSWORD. This data is entered by a virtual keyboard shown on the screen.

In systems equipped with (optional) badge readers, the login phase is completed by entering the personal card into the reader. Optionally, access to the system is also allowed by manually entering the data, however in this case the badge reader is inhibited until the following access or login attempt.

Figure 37 – Login screen on FEP ME 640.

FEP ME systems of all sizes have the same man-machine interface; however the colours of some of the software option change as well as the performance characteristics of the machines.

This manual is illustrated using examples from the FEP ME 640 system, as their only differences from the other systems consists of interface colours and panel type, which are described in detail in the dedicated chapters.

Figures shown are obtained from a system configured for 2 monitors, to provide as much information as possible. In single-monitor mode information on the other monitor can be recalled by pressing the dedicated button on the monitor-change panel.

Authentication can fail if the USER ID and the PASSWORD are wrongly entered, if a specified user is not activated or if the card used does not properly operate; the system will show a message describing the error that has occurred causing the refusal of access.

By default the equipment are supplied with the following USER ID and PASSWORD already enabled:

USER ID	PASSWORD	FUNCTION	PRIVILEGE
P900001	900001	1st level Administrator	⇧
P900002	900002	2nd level Administrator	
P900003	900003	3rd level Administrator	
P900004	900004	Operator	

It's suggested to change the default PASSWORD.

6.3.4. Application menu

Authentication takes the user to the application menu screen, where access is allowed to various programs, according to the privilege level assigned to the operator.

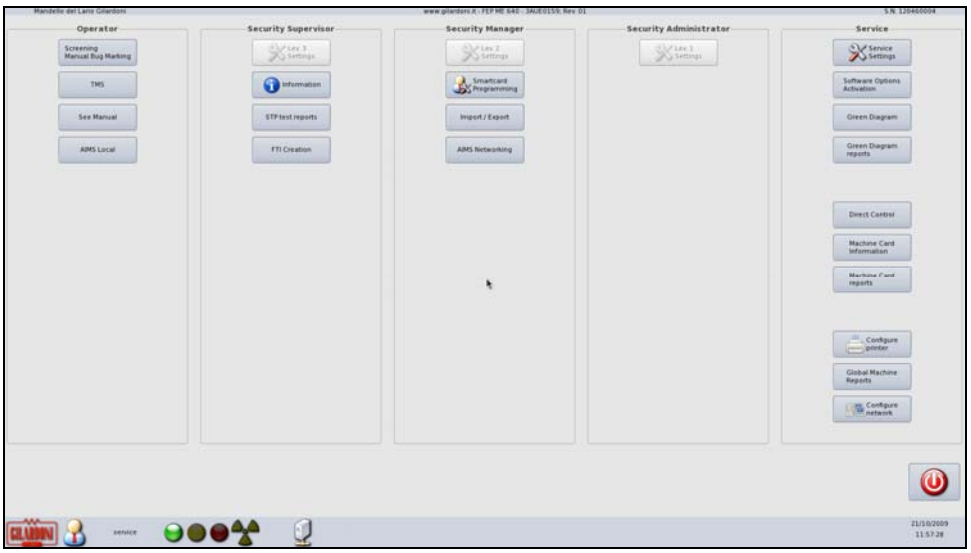


Figure 38 – Application menu

An operator is usually defined in the system as a user with access level 4, in which case if properly configured access is only allowed to the first application column.

The other columns, displayed by disabled function keys ("grey") are reserved for users with higher privileges, such as users with system administration and maintenance functions (not described in this manual).

The operator has access to X-ray image analysis and scanning page by activating the "Scanning" function key (the first button on the top left hand side).

After LOGIN, the operator can directly access the scanning page, if properly configured at administrator level.

The following applications are available for Operator:

TMS: this is the TIP Management System, which allows the user to display his/her personal TIP reports and FTI MISSED, if this option is activated and configured.

Manual consultation: this allows a user to consult the manuals that refer to their own access level in the system configuration language.

Local AIMS: this allows the display of working sessions that have previously been stored on the machine, identifying the USER ID of the Operator who scanned the luggage and the luggage identification; it also allows the user to perform all the post processing that is available on the system.

A description of the luggage scanning page follows.

6.3.5. Information and operating status

Information always present on the main screen is organized in two bars, one located at the top of the screen, the other at the bottom; the first shows the following information:

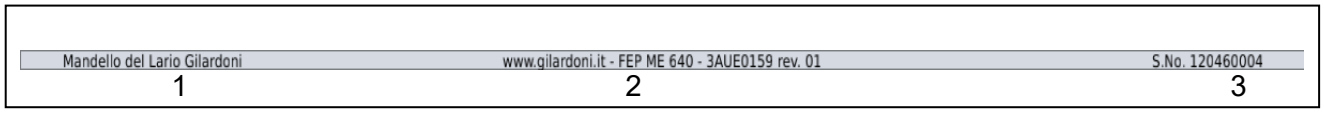


Figure 39 – Top bar in main scanning screen

1. Machine installation place.
2. Equipment revision model and number.
3. Machine serial number.

The latter, indicated like a status bar, shows the current status of the equipment.

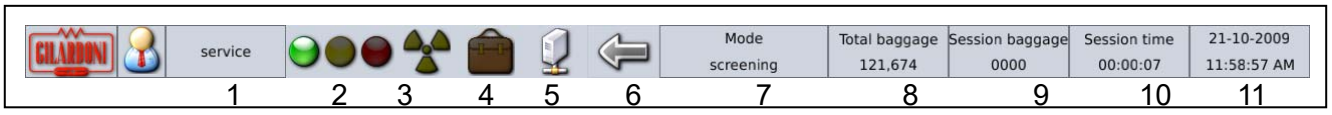


Figure 40 – Status bar in main scanning screen

1. User identification (USER ID)
2. Machine status light.
    a. GREEN: perfectly operating system
    b. YELLOW: usable machine, but in warning status determined by previous warning messages; the machine could have cooling problems, too many broken diodes, wrong or missing calibration carriers, etc.; it is recommended to contact technical support; but the system can continue to be used.
    c. RED: non-operating system, with a shutdown provoked by previous warning messages; the machines vital sub-systems are not working; contact technical support.
3. X-ray warning light: it lights up to indicate effective X-ray emission by the machine.
4. Luggage warning light on field: it lights up to indicate the presence of luggage inside the machine tunnel.
5. Connection status between machine control software (server) and display software (client); if a red X appears above the cable graphic representation, software communication problems

exist. In case of malfunction, it is recommended that the user wait for a few minutes, if connection is not restored, start the system again and contact technical support.
6. Conveyor scanning direction; when the arrow is blue, it means that the moving roll is taking the conveyor forward or backward.
7. Operating mode: it indicates whether the machine is scanning, in RAM navigation mode or in a special mode, such as FTI creation, AIMS, II client or other.
8. Total luggage: this is the number of pieces of luggage scanned after the machine was used for the first time.
9. Session luggage: this is the number of pieces of luggage scanned from the beginning of current working session; this value automatically resets to zero at each LOGIN.
10. Time session: it indicates minutes spent, for current LOGIN, from the moment when scanning mode was started. Time is shown in flashing red when the session ends notice time expires, following configuration settings.
11. Date and time.

6.3.6. RAM navigation mode

This function allows the operator to quickly review the last luggage scanned, by accessing stored data using the navigation keys shown in the panel figure, without stopping ongoing scanning operations and still having access to local AIMS.

This stored data accounts for about 15-metres of scanning, i.e. between 20 and 30 cases, and allows the operator to instantly review a small amount of previously scanned luggage. During RAM navigation, all image processing functions made available by the machine can be used.

Press the scanning forwarding key to automatically restore the most recent luggage display and reactivate the scanning.

6.3.7. Warm-up phase

This procedure is enabled and automatically managed by the machine to properly initialize the X-ray source, dependant on the off time since the last machine usage.

Warm-up is only performed after LOGIN by any enabled operator, as it implies the emission of X-rays which can only be activated if the machine is controlled. Residual time for completing the warm-up phase is shown on the screen.

The execution time of this procedure, during which the X-ray tube is progressively powered from 80 kV up to 160 kV is summed up in the following table:

MACHINE SHUTDOWN	DURATION
< 8 hours	Warm-up not made
8 hours – 48 hours	46”
48 hours – 1 week	132”
1 week – 1 month	227”
> 1 month	720”

Table 1 – Warm up times

6.3.8. STP test function

The STP (Standard Test Piece) test defines the assessment criteria of basic performance required by law for using the system in airport environment. The test must be performed in modes and times provided for by the local laws enforced.

The procedure starts by cleaning the screen and showing a memo on how to make the test (Figure 41).

The test piece must be place on the conveyor belt close to the right hand edge of the tunnel entrance. The test piece must also be oriented so that the maximum thickness side of the metal scale inside the test piece case is oriented to the external side of the machine, and is thus the last to enter the machine. Now, scanning can be commenced by using the conveyor handling controls and the belt can be stopped when the test piece is fully displayed.

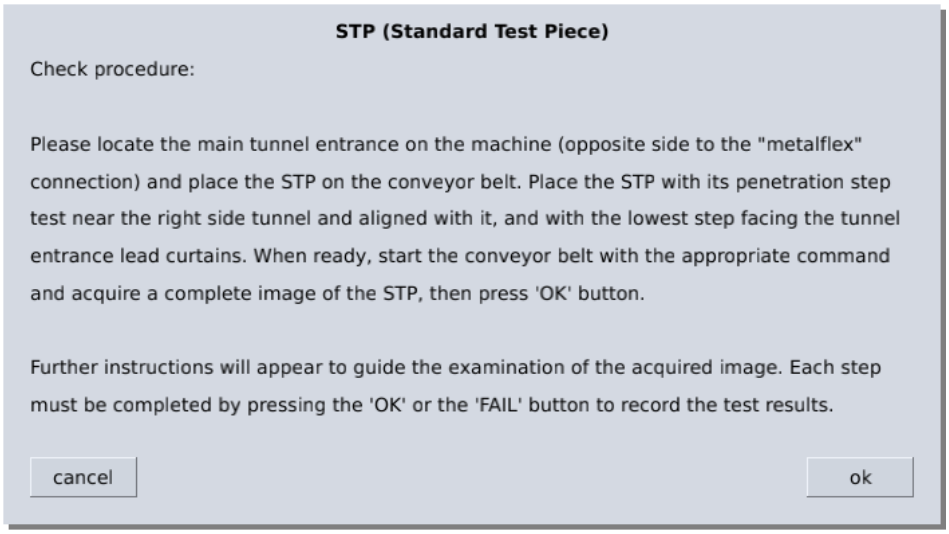


Figure 41 – STP test introduction window

When the test piece is positioned satisfactorily, press the ok button to start the assessment of each test phase. Also during these phases, video messages are shown (Figure 28) asking the user to analyse some typical features of the test luggage and specify the result of each test by pressing the ‘failed’ or ‘ok’ keys. The test can be stopped at any time by pressing the ‘cancel’ key, if necessary.

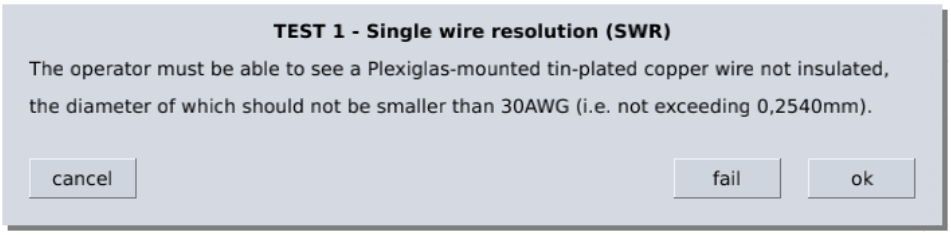


Figure 42 – Window where result of a STP test phase is entered

When the tests are completed, a summary window is displayed, with the results obtained (Figure 33), the confirmation key allows the STP test procedure to close.

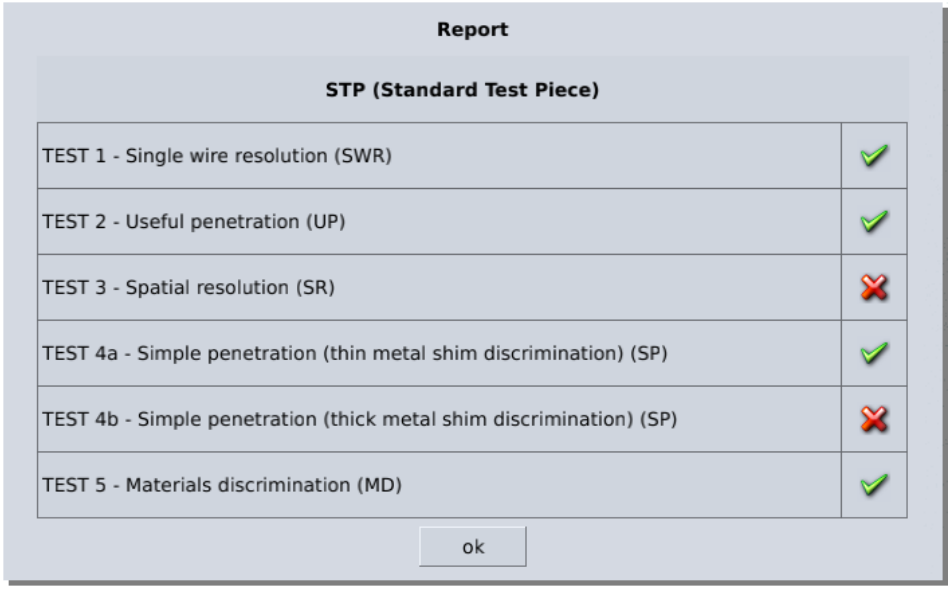


Figure 43 – Summary window displayed at the end of STP test procedure

The software stores the result of each STP test made on the machine for further reference using the report management interface.

If the user detects the failure of one or more STP test phases, the machine is considered unreliable; it is recommended that the user should contact their technical support for help. Machine operation can continue, but this abnormal operating condition produces a yellow warning light on the status bar.

The procedure of STP testing only gives an indication of system performance with the addition of results archiving. Regular management of the results and analysis of the basic system performance is strongly recommended.

For dualview system the STP test must be analyzed twice: the right sequence is shown on the monitors.

6.3.9. Examining

1. After the system switch on procedure has been completed, press the “LEFT” (11) or “RIGHT” (13) key, according to which forward direction has been set up for the unit and place baggage on the conveyor belt. The conveyor will start moving to commence the analysis phase. Use the “STOP” (12) button to stop the conveyor and interrupt the scanning phase.

2. When scanning is started, the following condition occurs:
    a. any pop-up messages disappear;
    b. image post-processing icons disappear;
    c. when the conveyor forwarding command is given, the indication “arrow” lights up in the acquisition direction, i.e. scanning acquisition direction, as well as the image display direction on the screen, meaning the way the image “enters” and the sliding direction of display.

d. When the luggage passes beyond the photocell, the machine starts emitting X-rays, with the relevant display (yellow ICON RX) and X-ray image.

3. The luggage on the conveyor is taken through the tunnel where it is radiated for the whole transit time, by the x-ray beam. This condition is confirmed by the illumination of the 'x-ray on' warning lights, in the four tunnel angles, on the control panel and on the main monitor. The original monochrome x-ray image and the digitally-recoloured image of the luggage content are continuously displayed on the two monitors, while the luggage goes through the x-ray beam.

4. After passing through the x-ray zone, the luggage exits from the tunnel where it can be reclaimed.

The last scanned image remains on the monitors until scanning is started again, to display the new X-ray image.

The second monitor, with the black and white X-ray image is not equipped with a user graphic interface. This is exclusively concentrated on the main (colour) monitor, as the monochrome monitor only shows the original X-ray image.

The alarms which identify dangerous materials are set on the colour monitor for functions concerning the type of material and on the monochrome monitor for functions concerning examination of high density materials.

Images are displayed on the monitor for a minimum of 5 seconds as the baggage transits through the machine. The display time is extended if no following baggage enters the machine or if the conveyor is stopped for "image post-processing" on the image displayed and the image is then only replaced when new baggage is scanned through the machine.

All the post processing functions carried out on an image are reset when new baggage is scanned through the machine.

Each "event", i.e. machine phase involving operator actions, will be characterized by a message display and a sound effect, Even if the interface has no BUZZER, with this format the operator will always know what the machine is doing in each operating phase.

6.3.10. Material identification system

Selecting the image colours allows the user to recognize the class of each material that is present in the baggage under inspection. This enables a user to gain a more rapid identification of dangerous items (for example metal items, such as knives, weapons, blades, etc.) or explosive contents (areas full of organic material, etc.). The correspondence between colours applied to the image and the type of material set by the machine is summarized in the following table.

Orange	Materials with low atomic number, usually organic or plastic materials. Several dangerous or prohibited substances, such as plastic explosives and drugs, belong to this class.
Green	Materials with intermediate atomic number, usually inorganic materials, light metals, amorphous substances, such as aluminium.
Blue	Materials with high atomic number, usually metals like iron and steel.
Black	Very dense or very thick items. X-rays crossing them are so attenuated that they cannot be classified as one of the other types.

Table 2 – Correspondence between colours and type of materials

6.3.11. Explosives identification system: ADS algorithm

The complex ADS algorithm allows a reliable automatic recognition of explosives hidden inside the luggage. The processing result is shown to the user by enclosing the suspect zones in coloured frames.

The factory setting for ADS models associates explosives with atomic number corresponding to plastic explosive, TNT, dynamite, Ammonium Nitrate with red frames (first window alarms) and drugs with yellow frames (second window alarms).

Even though the ADS algorithm represents the current state of the art in explosive recognition, the indications that it provides do not absolutely guarantee the presence of suspect materials, thus it aims to draw the operator's attention to potentially significant image elements. It should however be pointed out that the operator is the final responsible person for assessing the real danger of items examined.

6.3.12. Dangerous liquids detection module

If the system is equipped with the optional module for dangerous liquid detection (Liquid esplosive detection system), for its operativity refer to the document cod. 64860135 "Dangerous liquids detection module's User Manual".

7. “Image post-processing” functions

7.1. Post-processing activation

A set of functions are available to the user which are activated by a set of dedicated buttons located on the panel. These buttons can be used like shortcuts or alternatively, mouse and icon menus can be shown on the monitor by pressing the “SELECT” button.

The bar of active post-process functions, shown on the top left hand side of the screen is constantly informing the operator on which post-process functions are active on the current image.

Figure 44 – Active filters frame

The operator can freely activate multiple filters at the same time, and each post-process configuration generated by the user can be stored like a customized combination which can be associated to any programmable key.

Using a post processing group associated with a programmable key sets the current filter settings to zero.

Post-processing implementation time on the displayed image does not exceed 500ms.

7.2. Using the Post-processing functions

Functions to be activated by the procedure described in the previous paragraph and the following selection of icons on the screen associated with dedicated keys are generally made while the conveyor is stopped.

7.2.1. Quick activation and deactivation operation

In this mode, the filter remains active from the moment that the corresponding key is pressed on the panel until it is released.

This action applies if the post-processing key is held pressed for at least 700 ms.

7.2.2. Post-processing circular operation

Parametric filters, which are accessed via software windows, can be preset with steps to enable quick and easy usage via keyboard shortcuts. The following figure shows the operation of a 5-activation-step filter:

Shifting between different statuses is made by clicking through on the panel key to the post-processing function required. Deactivation of the filter is achieved by following the instructions described in the following paragraph.

7.3. Post-processing deactivation

Each post-process function can always be deactivated by using the corresponding icon on the monitor.

Filters can be deactivated in sequence, right to left, according to their appearance order in the active filters frame, by pressing the RESET key. However, if this key is kept pressed for longer than one second and then released, the filters are set to zero.

Conveyor handling activation (both forward and backward) will also cause the immediate removal of all the post-process functions applied, but this action can be cancelled by configuration of the application display settings.

In post-processing circular activation mode, each filter is deactivated by pressing the post-processing key following the last filter step.

7.4. Image post-processing

7.4.1. Edge enhancement filter

This function activates a filter to enhance (or soften) the edges of the various elements that the image consists of. This has the effect of helping an operator to improve their recognition of wires, electronic wires, small thickness changes, thin grids, nail files, etc.

When the dedicated panel key is used to activate the filter, the activation can be either toggled on or off or increased step-by-step. When the mouse is used however, sliding the bar on the screen allows the filter action to be changed as required.

Figure 45 – Edge Enhancement

7.4.2. Optimum contrast

Using this function, image colours are automatically changed to maximize the usage of colour levels for the luggage currently on the screen. See also Windows contrast function.

When the dedicated key on the control panel is used the function can be toggled on or off.

Figure 46 – Strong contrast effect entered by 'Optimum contrast'

7.4.3. Penetration level

This function allows an operator to change between low and high energy contributions to the video image. Low energy data allows a user to distinguish between low thickness items, whilst the high energy data allows thicker materials to be penetrated thus enabling an operator to view elements which otherwise would be hidden.

The sliding cursor shown on the screen allows a user to choose the ratio between the two energies.

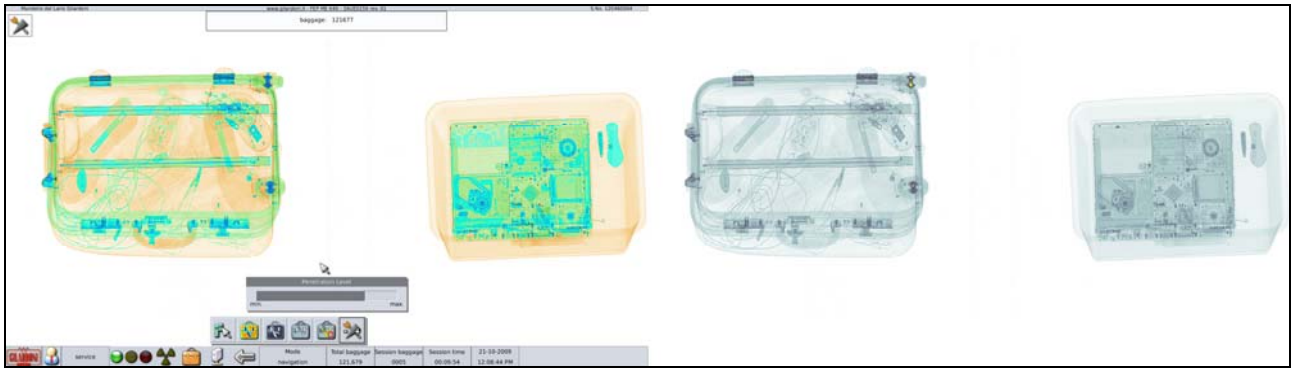


Figure 47 – Display mainly based on high energy data: the highest absorption details are shown, otherwise they would be invisible

7.4.4. High energy

This function allows the user to display only the high energy contribution of the image. The high energy data allows thicker materials to be penetrated thus enabling an operator to view elements which otherwise would be hidden.

When the dedicated key on the control panel is used the function can be toggled on or off.

7.4.5. Zooming a luggage part

With this function, when the image is stationary on the monitor, by pressing the zoom button (6) an operator can seamlessly zoom the image between 1 and 64 times, by using the cursor shown on the bottom of the right hand monitor (Note: The zooming of the image is limited by the size of the zoom window). The zoom window can be resized by selecting the relevant window and changing the boundaries by using the or the right/left arrows on the panel.

When the dedicated key on the control panel is used the function can be toggled on or off.

The position of the zoomed section can be changed by moving the area highlighted in transparent grey on the left hand monitor (the zoom window positioning monitor).

The zoomed image can also be rotated by using the second “rotozoom” cursor shown at the bottom of the left hand monitor.

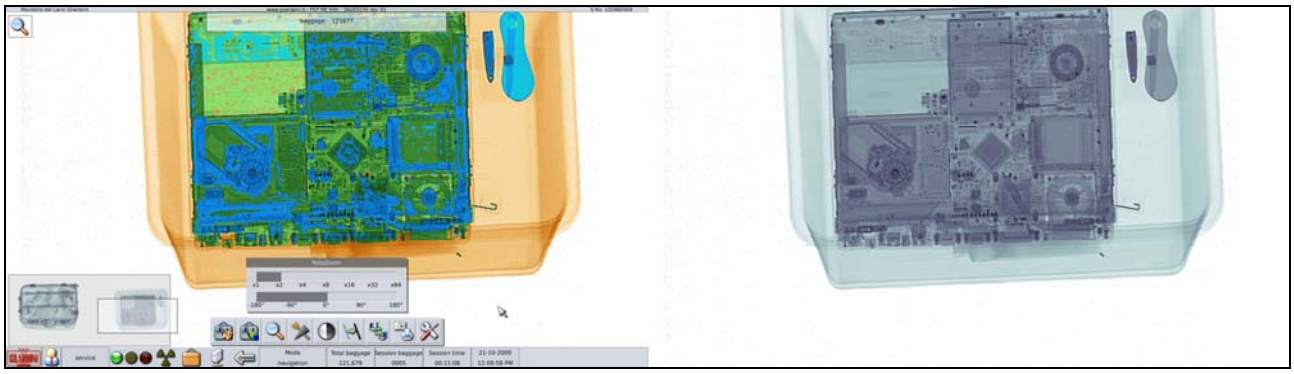


Figure 48 – Zoomed luggage section; the frame on bottom left side shows the entire image

7.4.6. Energy stripping

This function is activated by pressing the “energy stripping” (19) button or selecting the 2th icon from the left of the screen with the SELECT key.

The energy stripping function allows the user to select and display a particular material type on the colour monitor only or additionally on the monochrome monitor by choosing the preferred option in the selection window.

When the dedicated key on the control panel is used the function can be toggled on or off.

The following families of materials are displayed autonomously by selecting the relevant “Energy Stripping” window:

- Organic (orange-coloured items)
- Inorganic (green-coloured items)
- Metal (blue-coloured items)

Figure 49 – Energy Stripping: removal of metal and inorganic materials

7.4.7. Monitor switch

This function enables a user to toggle between a monochrome and a colour view. In systems which consist of two monitors the luggage image generated on the left hand monitor is exchanged with the image on the right hand one. If the unit is in single-monitor configuration, exchange is made with a miniature image located in the bottom left hand corner of the screen.

When the dedicated key on the control panel is used the function can be toggled on or off.

7.4.8. Programmable user configuration keys

These keys which are only available on the control panel allow a user to activate a default, i.e. previously stored, post-processing combination. This default is activated by pressing the “PROG 1, PROG2, PROG 3 (17 and 18) buttons.

When one of the PROG keys is pressed, all the post-processing functions and the various levels stored associated with this key are simultaneously activated, accelerating typical and personal post-processing selections.

PROG. key storage is associated with the USER ID of the operator that is logged in.

The configuration of PROG keys can be partially or completely assigned to special functions or they can be deactivated and locked on post-processing functions defined by the system administrator.

7.4.9. Other post-processing functions

This function provides access to a processing function menu for images to identify details that are otherwise not clearly recognisable. Some of these post-processing functions can be directly activated from the panel.

Figure 50 – Appearance of other post-processing functions menu

Pseudo colour

This function changes the monochrome image by applying random colours to enhance absorption differences in the various luggage areas, independently of material they consist of. In this way the operator can recognise details which would otherwise be difficult to see.

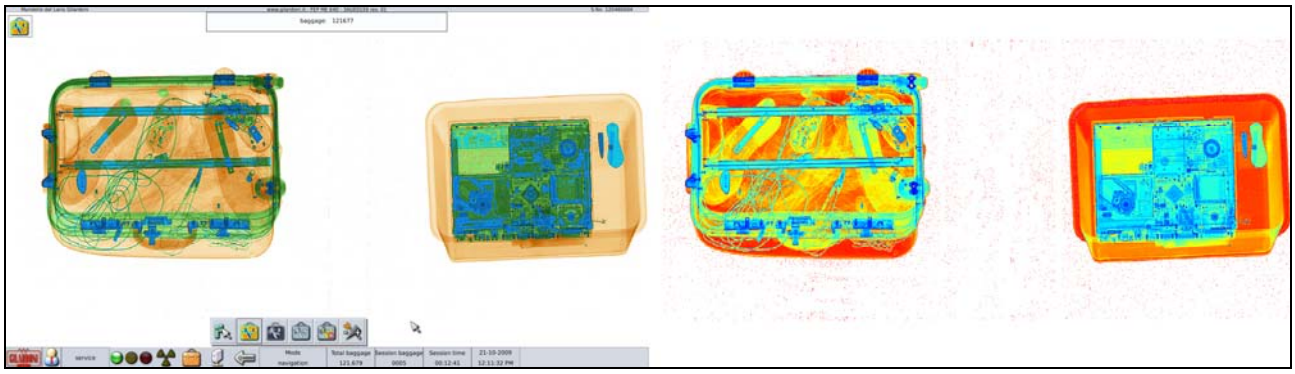


Figure 51 – Pseudo colour: grey display is replaced by random colours on the right

Negative image

this function activates a negative image display, making the luggage view similar to common X-ray plates where soft elements are shown in colours tending to black, while dense elements are shown in lighter colours.

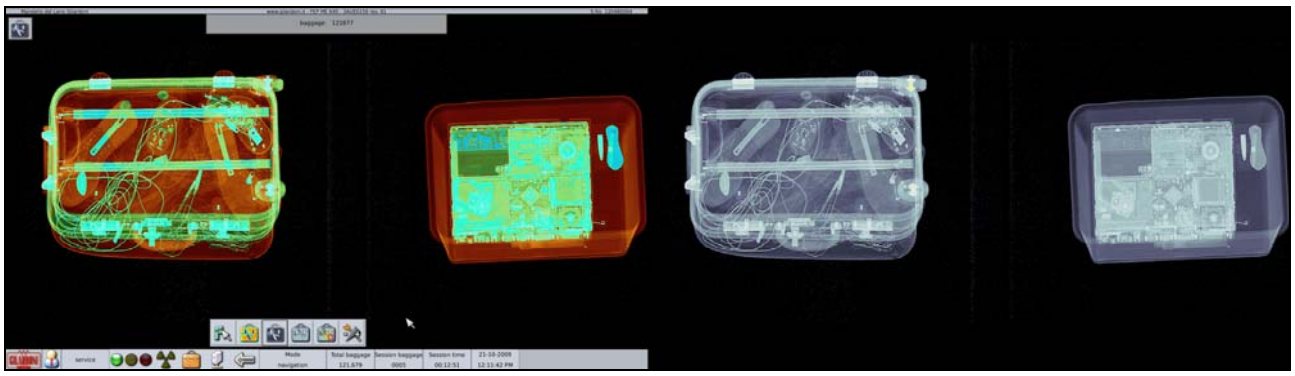


Figure 52 – Negative image

Windows contrast

This function allows a user to maximize colour levels to show areas with certain absorption, to highlight differences of level variation inside the image.

This is very useful to distinguish items in areas where absorption is strong or very homogeneous.

The window extension and layout area can be fully controlled compared with absorption values so that the filter application field can be exactly defined.

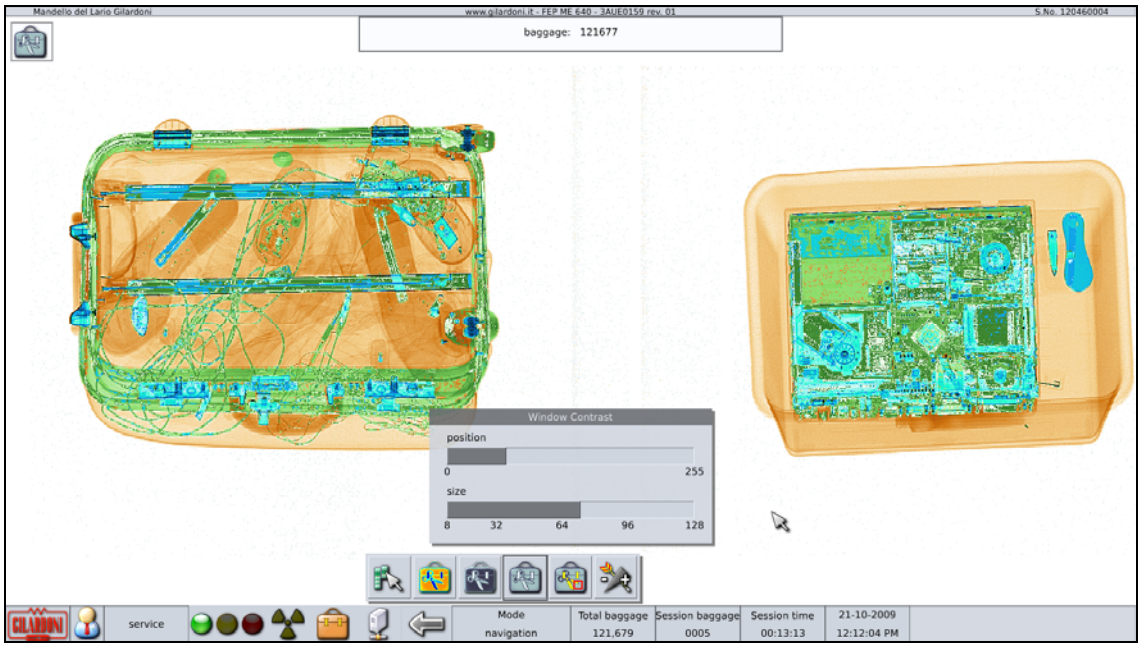


Figure 53 – With the contrast window properly set, a pair of glasses stand out within their case

Cancelling dangerous material and density alarm display

The dangerous material and density alarm display can be deactivated to maximize the visibility of contents that have generated an alarm. The alarms are reactivated by the following key press or by using the conveyor handling commands.

7.4.10. Managing images and image sessions archives

This function provides access to the image storage, screen printing on paper and image loading.

Figure 54 – Appearance of archive managements menu

Images storage

This function instantly stores the entire screen contents (one or two monitors), including the image with its active post-processing, windows, any messages, and mouse position, heading and status bars. Open menu bars are not included in the image save process.

The resulting file is stored in a PNG format which has no information loss due to compression. The image is stored in the image directory for the current day.

Images saved by this command can be examined at any time by using the recall function for digital images (see paragraph: How to recall digital images

How to recall digital images

This function allows the user to display one or more images that have previously been saved.
The files required are selected by a 'file management' type interface, where previews of images and folders for collecting images are highlighted.

Click on the folders to get in and out of them; clicking on previews to activate or deactivate the selection (shown by the squeezing of key where every single image is displayed).

Keys are available to select/deselect all or reverse selection.

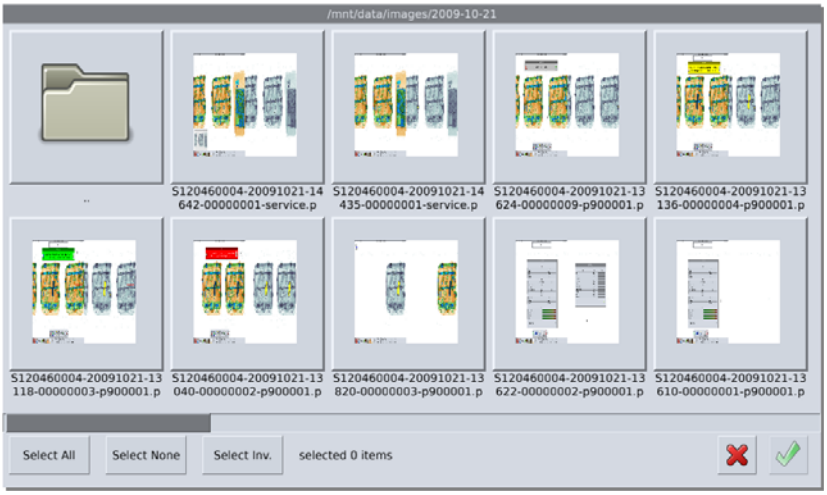


Figure 55 – Selection of images saved

Press the confirmation key to show the display window of all selected images (Figure 56 – Image viewer

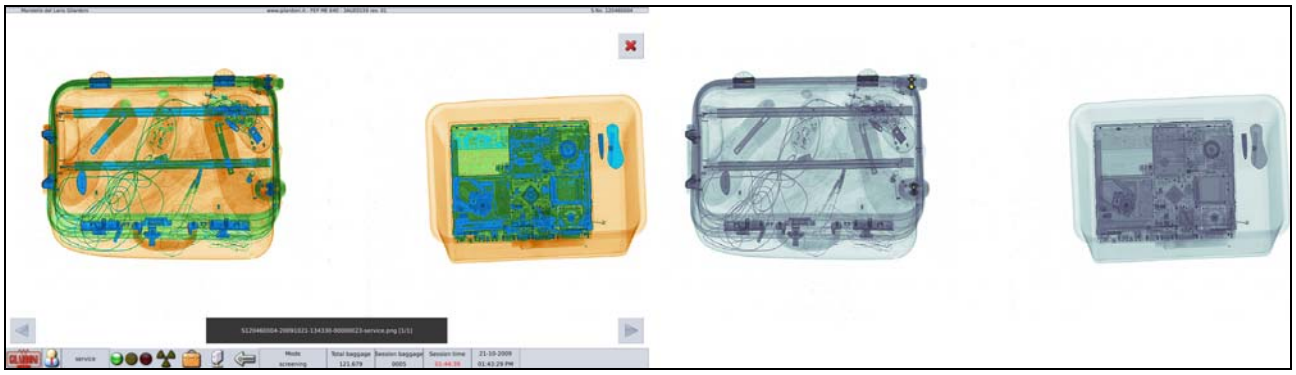


Figure 56 – Image viewer

Each file is shown at full size on the monitor. There are two blue slider buttons shown at the bottom right and bottom left of the screen to enable the user to move backwards and forwards through the image display.

The reference information for the file displayed is shown in the dark grey frame at the centre of the screen, in between the direction arrows, and it includes the archive name and a progressive number to identify the file in the group chosen for viewing.

The archive name is structured to provide for the following data, in order: the machine serial number, the date in YYYY-MM-DD format, the time in HH-MM-SS format, the image chronology and the USER ID.

The viewer window can be shifted by keeping the mouse pressed on an image section and dragging it to the direction required; this can be useful to compare images saved with newly-scanned luggage.

Image view mode terminates by pressing the red X button on the top right hand side in the viewer window.

Recalling stored working sessions

Loading of the working sessions automatically saved by the machine is only accessible from the application menu screen by local AIMS or SESSION RECALL keys on the panel.

Print of digital image screen

This function sends the screen content to the printer, as seen on the monitor, including the graphic interface elements, mouse cursor, and any active post-processing, etc.

User configuration menu

This menu gives access to all the scanning functions including reverse direction, programmable key customization and the green diagram (for service user only).

Scanning direction reverse

In systems with a double set of photocells (one for each end of the tunnel), this function enables the user to reverse the scanning direction to immediately transform an entrance gate into an exit gate and vice versa.

Storing programmable keys

This menu allows users to have access to the programmable key setting interface. The post-processing that is applied to the image when pressing one of the four keys contained in the window (Figure 37) is stored as a user's custom combination. In this way, the same filter configuration can be activated again by simply pressing the programmable key selected from the panel.

Figure 57 – Window for customizing the programmable keys

The administrator can prevent the assignment keys from being programmed or restrict programming to their own combinations. In this case the keys affected will appear opaque to the user.

7.4.11. Special functions

This function gives access to system information and the STP test mode.

7.4.12. System information

This allows access to the window containing important information on the machine, such as firmware and software revision data, as well as statistics on the usage of thee machines vital components.

Finally, the available disk space is summed up for data storage purposes by the use of bar indicators.

These files must be routinely cancelled during the service procedure to prevent the red zone from being reached.

While using the machine, the operator is warned when the disk filling threshold and the maximum file limit are reached.

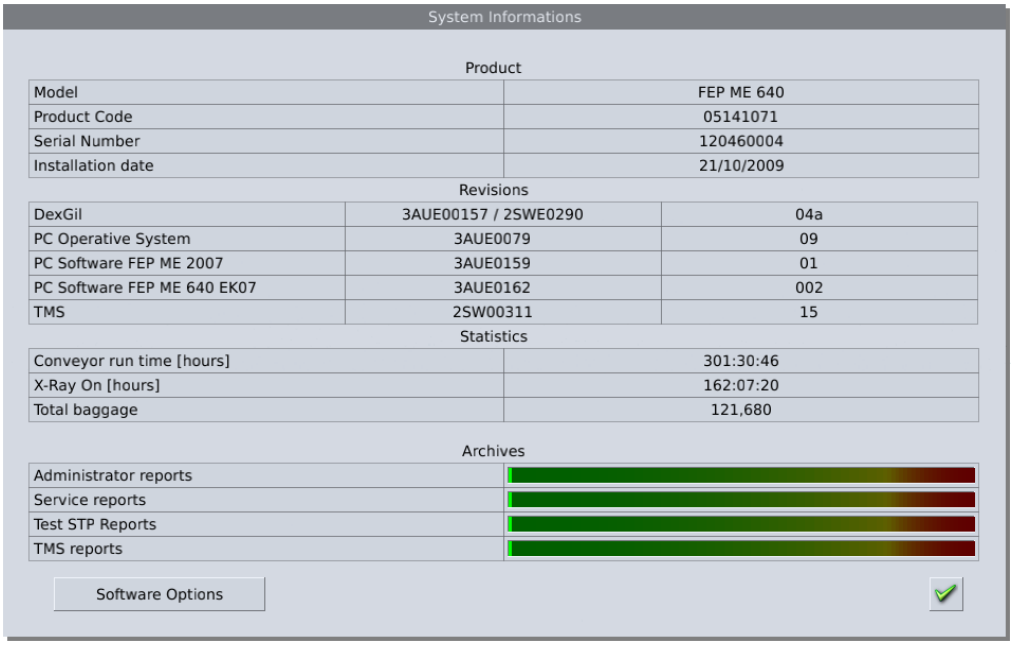


Figure 58 – System information panel

This screen gives access to the summary of software options that are active, could be activated or those which are about to expire.

Active software and software options that could be activated or restored are shown, however technical support action is necessary to reinstate these applications following business agreements with Gilardoni.

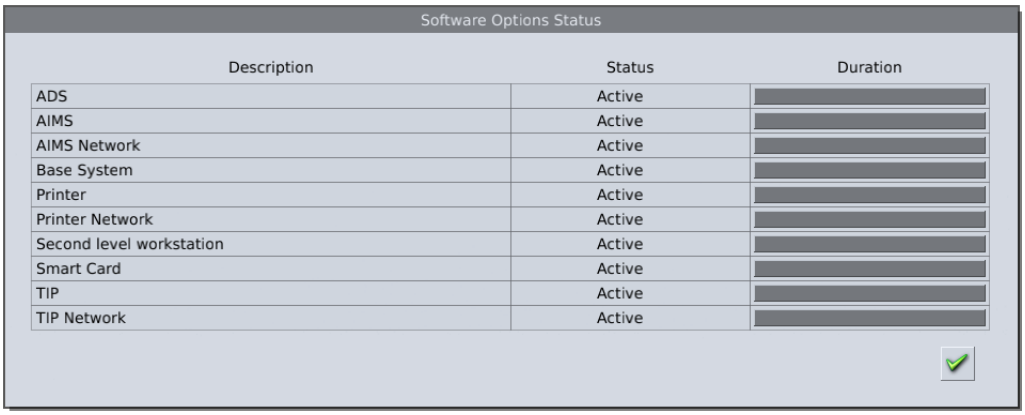


Figure 59 – Summary of software options status

7.4.13. Exit from scanning application

This is achieved by pressing the closing red key shown on the screen in the first position on top of the main menu. On exiting this option, the unit returns to the application menu screen.

7.4.14. Log out

The user can log out at any time by pressing the LOGOUT function on the control panel keyboard or by pressing the closing red key on the screen on the bottom right hand side of the application menu screen.

The working session is now completed and a new LOGIN can be performed.

7.5. Density alarm

This automatic function marks in yellow those sections that have been scanned which exceed such an absorption level that dangerous luggage parts could be hidden from view. The threshold level can be defined via the configuration interface.

This informs the operator that the machines x-ray penetration is not sufficient to show the content in such area, thus it is recommended that the user should devote special attention to the image by activating post-processing, opening the luggage and scanning the alarmed items or manually inspecting the luggage content.

The alarmed area is only displayed on monochromatic view and can be temporarily removed by the operator using the show/hide alarms post-processing.

With density alarm, suspect metal items have probably been found.

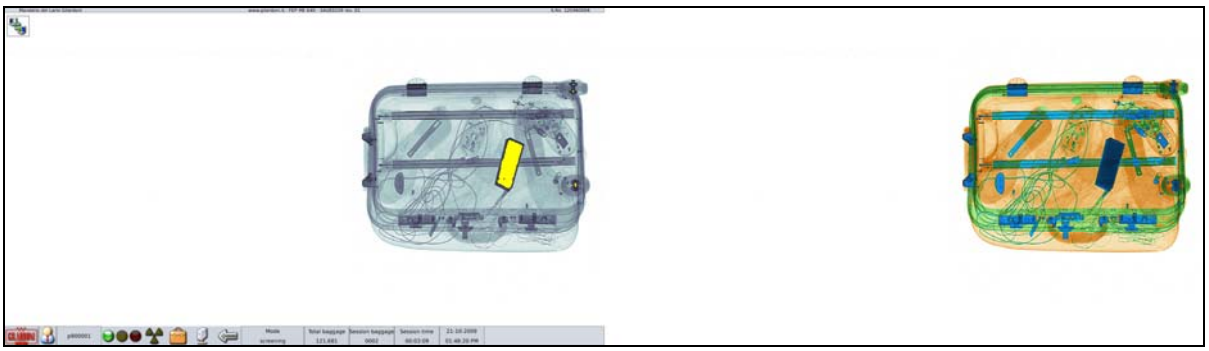


Figure 60 – Luggage density alarm

8. TIP function

This chapter describes the TIP function on the system as used for luggage check and aims to support both the operator and the technician in its correct use.

The TIP function also includes a TIP management program named TMS (TIP Management System), a program which provides for TIP function configuration, report creation, user management, etc. The TMS user manual also includes documents on functionality which are reserved for system administrators.

TIP (an acronym of “Threat Image Projection”) is software which allows the automatic overlapping of predefined virtual images of dangerous items on real images acquired by the system for luggage check, to ensure a high quality level of baggage monitoring at the check station, and creating a constant improvement process for the performance and skills of the operator in charge of checks and also monitoring those aspects which could affect the station ergonomics.

The performance improvement process of the user due to the TIP function, mainly consists of monitoring the operator’s attitudes by assessing their reactions when fictional dangerous images are shown carefully mixed into the real luggage being scanned.

In this way the system creates several fictional situations where the operator must make important decisions to ensure a high safety level.

Routine reports allow analysis of the performance of single operators and identify criticalities defined by particular types of images or by the micro-environment of the scanner itself, possibly affecting the ergonomics of the unit.

This data allows administrative staff to act to eliminate or minimize any criticalities found, improving the operators’ performance by in depth and well-defined courses (training) or improving a critical micro-environmental situation on a special scanner (light or noise,…) to ensure a high quality level, constant in time and among devices themselves.

Analysing reports defined in this way also allows administrators to determine the best TIP system configurations for a specific unit.

8.1. TIP operation

The TIP function is a FEP ME system option which is only to be activated and executed with these systems and should be exclusively used by operators of this equipment.

TIP functionality does not interfere with normal system operation.

TIP functionality is an option to be configured on the luggage check system by authenticated personnel only having the correct system access levels.

Going deeper into the TIP operation, the operator must view the virtual item by pressing a proper key on the control panel (the SUSPECT key).; If the key is pressed more than once it will still only be interpreted as a single action concerning the TIP event in progress.

If this key is not pressed before the item passes out of the monitor or structure timeout, the software automatically stops the conveyor movement and luggage image acquisition to display a warning message for the operator on the monitor.

The program automatically records all reactions when entering the suspect images for a certain operator and allows for the subsequent check (TMS) of results and the display of customized reports.

TIP functionality provides for the operators' management for safety, identification and traceability reasons; the system univocally identifies operator by his/her USER ID at LOGIN level and terminates operator's management at LOGOUT.

8.2. FTI insertion phase

TIP function on luggage control systems mainly consists of adding default virtual images of dangerous items on real images scanned by the system.

The default virtual images of dangerous items, commonly called FTI (Fictional Threat Image), are inserted at a frequency adjusted by parametric configurations defined in TMS.

FTIs are implemented to be added into scanned luggage images, in a hidden form, to check the operator's attention.

Taking into account luggage dimensions, the position where FTIs are located into the luggage changes so that their insertion is not easily checked by inspection of a single area of the luggage.

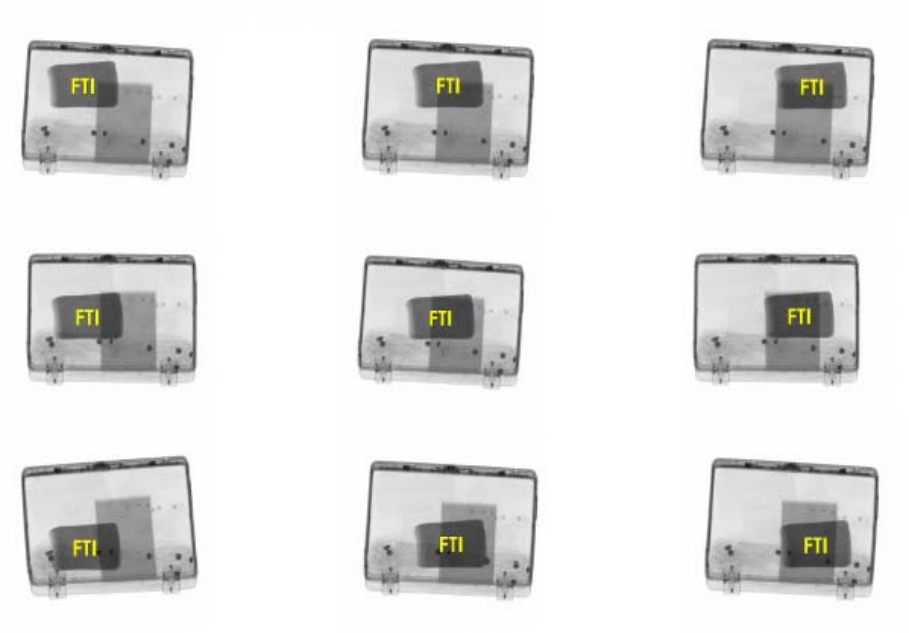


Figure 61 – FTIs inserted in luggage X-ray data

FTI libraries are dynamic and can be updated during the product lifecycle.

FTI libraries consist of FTI categories, typically
- weapons,
- knives,
- explosives (IED)
- miscellaneous

A sub-classification is also allowed for each category.

When adding an FTI to the scanning luggage, the operator must view the virtual item by pressing a proper key on the panel (SUSPECT key).

When an FTI is added a time counter starts, with a value set in TMS to determine the IDTP (Initial Decision Time Period).

If the operator stops the conveyor belt to better check the image, also supported by post-processing options, the IDTP initial count stops and a second one starts, also with a value set in TMS, named the TDT (Threat Decision Time).

8.3. Messages concerning TIP events

Four types of messages are provided for with each associated with an operator's reaction when FTIs are added by the system, shown by pressing SUSPECT key.

Messages consist of a single sentence on each line (to be set by Supervisor) and explain the reasons why message has appeared, actions to be made by operator after the message appearance and finally a recommendation to re-analyse the real image is made available after message cancellation.
Messages appear immediately after the operator's reaction and can only be manually cancelled.

Messages appear in standard modes and frames and tend to minimize the luggage section they cover.

8.4. FTI found (HIT)

If an operator finds an FTI and presses the SUSPECT key:
- before IDTP timeout
- before TDT timeout, if he/she stops the conveyor
- before image gets out of monitor (the worst case with subsequent 5-sec scannings),

the system records a TIP event HIT, stopping the conveyor and showing the operator the proper FTI identification message (typically on a green background), FTI type found and FTI highlighted in the image (hatched red rectangle):

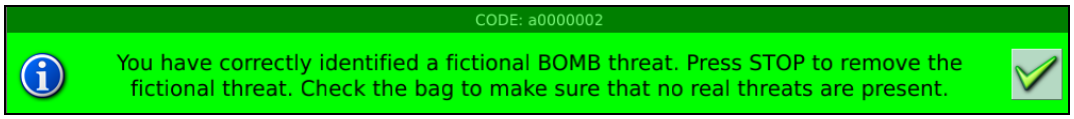


Figure 62 – FTI found message (HIT)

After reading the message, the operator must press STOP to restore the real image and check it does not really contain dangerous items.

After this analysis, the conveyor is restarted by performing a new scan using the conveyor handling keys.

8.5. FTI not found (MISS)

If one of the three previously-mentioned conditions (chap. 8.1) is not met, the system records a TIP event MISS, stopping the conveyor and showing the operator the missed FTI identification message (typically on a red background), FTI type found and FTI highlighted in the image (hatched red rectangle):

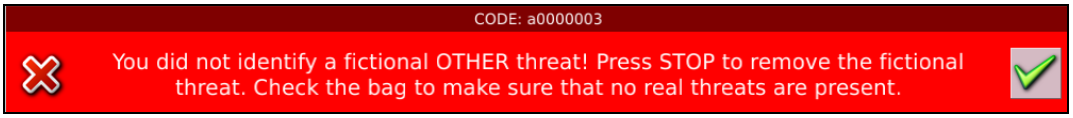


Figure 63 – FTI message not found (MISS)

The system stores information on the event in order to report the TIP data using the TMS.

After reading the message, the operator must press STOP to restore the real image and check it does not contain real dangerous items.

After this analysis the conveyor is restarted by performing a new scan by using the conveyor handling keys.

8.6. FTI not present (NO TIP IMAGE)

An operator could press the WATCH key by mistake or assuming an FTI is present.

In this case, the system records a TIP event NO TIP IMAGE, stopping the conveyor and showing the operator the false FTI identification message (typically on a yellow background):

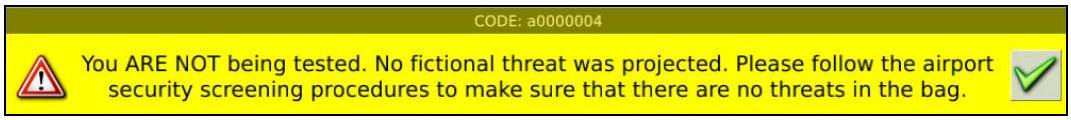


Figure 64 – FTI message not present (no FIT)

After reading the message, the operator can further analyse the luggage without pressing.

8.7. FTI cancelled (ABORTED TIP IMAGE)

The system can abort setting an FTI if it exceeds the edges of luggage examined or overlaps an ADS alarm.

In this case the system records the TIP event as ABORTED TIP IMAGE, stopping the conveyor and showing the operator the insertion FTI cancellation message (typically on a grey or blue background):

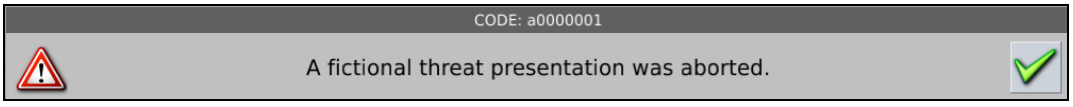


Figure 65 – Aborted FTI message

After reading the message the operator can press the conveyor handling keys to restart the conveyor and continue the scanning process.

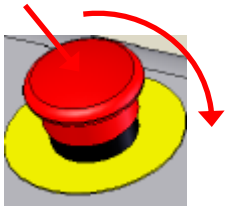

Behavioural information obtained from operator's response to TIP events is sent to TMS program and is used for drawing up the performance reports on the operators themselves (see TMS use manual).

8.8. Acronyms

Terms with a specific meaning are used in this document as described below:

- TIP: Threat Image Projection
- TMS: TIP Management System
- FTI: Fictional Threat Image
- IED: Improvised Explosive Device
- HIT: FITs properly found by operator
- MISS: FITs not properly found by operator
- NON TIP: WATCH key pressed with no FTI present
- ABORT TIP IMAGE: FTI insertion not succeeded by the system
- TIP Data: data generated by scanning device necessary to report creation by TMS

9. System stop and restart in emergency situations



Activating one or more of the emergency buttons immediately cuts the power supply to the moving roll or x-ray emitting system.

Restore the system by rotating the red part of emergency until the reset mechanism is triggered. The machine is then ready for operation after a few seconds, after the re-initialization procedure is completed.

Use these buttons only in case of immediate and real danger to persons and things, otherwise stop the unit using the conveyor stop command.

10. System switching-off

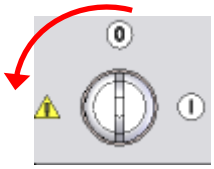
Switch the system off by rotating the key switch on the panel counter-clockwise into the zero (0) position.

When the server switching-off message appears on the screen the machine is performing the shutdown procedure during which the green indicator light close to the key switch is switched off. The green light re-illuminates to confirm that switching-off has properly completed.

This procedure can last for one or two minutes, after which the key can be removed.

11. System forced switching-off

This procedure must be performed only if the system cannot be switched off normally.



Rotate the key switch counter-clockwise to take it to the position shown by the exclamation mark danger symbol on the left hand side.

The system power supply is interrupted for a few seconds. Please Note: All data not already written to the disk will be lost.

12. Improper use of system

During use the FEP ME class inspection equipment emits ionising radiations inside the luggage inspection tunnel and contains moving mechanical parts.

It is therefore recommended that the equipment should only be used in compliance with the instructions contained in this manual and that the operator must prevent any improper system use, such as:

- Unnecessary activation of conveyor belt, both forward and backward, or without ensuring there is no risk for persons and things present in the vicinity of machine.
- Putting liquids not contained in closed containers in the tunnel.
- Putting small size items without using baskets or containers in the tunnel.
- Putting, even partially, live animals or persons in the tunnel.
- Putting limbs or body parts in the tunnel when x-rays are emitted;
- Allowing x-ray activation when the factory fitted lead protection curtains are removed or damaged.
- Leaning on the conveyor belt while it is moving.

13. Maintenance

13.1. Routine maintenance

Any maintenance operation must be performed with the system disconnected from the electric power source. The operator can ensure power supply isolation by simply taking the mains plug close to the working area.

No specific maintenance work is required by users: it is simply recommended to perform normal cleaning and dust removal operations.

Clean all appliance parts by only using a cloth wetted with water.

For the conveyor belt, use soapy water, rub with a brush and be careful not to leave water dropping inside the appliance.

Warning:
NEVER USE SOLVENTS OR OTHER CHEMICAL SUBSTANCES SUCH AS GASOLINE, TRICHLOROETHYLENE, AMMONIA, etc.

13.2. Extraordinary maintenance

Gilardoni specialized technicians, located in several regional agencies in Italy, are always available for immediate service visits upon request, performed using original equipment and spare parts.

14. Operating procedures

14.1. Switching-on procedure

1. Ensure that the system can remain on
2. Ensure that the system has mains power properly supplied
3. Ensure that the key is in position 0
4. Ensure that the LED ready is illuminated with a green light
5. Take the key to position 1
6. Visually check the “BOOT” phase execution in the logic unit
7. Check the login page view.

14.2. Login procedure

Check the login page view.

14.2.1. Login virtual keyboard

1. Use the mouse to enter the USER ID on the virtual keyboard on the screen, validating this action by pressing Enter (the big key on virtual keyboard)
2. Check that the USER ID starts with a letter, not with a number. Use the erase (Cancel key) in case of error or completely restart the procedure (Clean key)
3. Use the mouse to enter your PASSWORD on the virtual keyboard on the screen, validating this action by pressing Enter (the big key on virtual keyboard)
4. The PASSWORD is not visible so asterisks are displayed instead of figures; use the erase (Cancel key) in case of error or completely restart the procedure (Clean key)
5. If the login procedure has finished successfully a menu page is displayed. If the relevant option has been configured, the luggage scanning page will be directly displayed.
6. If the login procedure has not finished successfully an error message will be displayed.
7. Reasons why login procedure may not be successful:
    a. Error in typing the USER ID and/or PASSWORD => type the USER ID and PASSWORD again.
    b. The user is not enabled on the system => ensure that the user is enabled to log on by contacting the administrator.
    c. if the problem persists, contact technical support.

14.2.2. Login from badge

1. Insert the badge into the relevant badge reader close to the panel.
2. If the login procedure finishes successfully, the menu page is displayed. If the relevant option has been configured, the luggage scanning page will be directly displayed.
3. If the login procedure is not completed successfully an error message is displayed.
4. Reasons why the login procedure is not successful:
    a. The badge is not enabled in the system => ensure that the user is enabled to login to the system by contacting the administrator
    b. The user is not enabled in the system => ensure that the user is enabled to login to the system by contacting the administrator
    c. If the problem persists, contact technical support
5. Please remember that the badge is not retained, therefore a standard logout has to be performed.

14.3. Switching-off procedure

1. Perform the logout procedure, ensuring access to the login page
2. Switch the key switch position to zero (0).
3. The illuminated ‘Ready’ LED switches off after about 1 minute and 30 seconds
4. The LED illuminates again in green.
5. The machine is ready to be switched on again or disconnected from the power supply.

14.4. Forced switching-off procedure

1. Insert the key in the panel in position -1 (forced switching-off) for at least 3 sec.
2. Wait for the LED to become green
3. Try switching-on again
4. If the problem persists, contact technical support.

14.5. Scanning procedure

1. Ensure that the login procedure has finished successfully and that the LEDs displayed on the monitor are green.
2. Move the conveyor forward using the command button on the panel, checking the “luggage on field” icon view is properly activated when the luggage intercepts the photocells
3. Check the X-ray image of the scanned luggage on the monitor.
4. Analyse the image by referring to all post-processing functions that are available on the machine and selecting the most relevant, according to the luggage type.
5. Check in detail any items that could possibly be components of bombs, such as:
    a. wires
    b. batteries
    c. metal items
    d. fuses
    e. weapon components, bombs or knives
6. Check in detail any items possibly forming explosive materials, such as:
    a. organic orange-coloured items
    b. organic materials hidden by metal materials, possibly coloured in green
7. Check ADS alarms in detail: red frames in sections with atomic number close to explosive substance, remembering that they can also be false positive
8. Check “Dark alarm” in detail: dense sections allowing for image to be displayed, but not the recognition of atomic number of underlying material
9. Check “Density” alarms in detail: sections with a density such that the item displayed is not clearly visible are surrounded by yellow frames
10. In case of any reasonable doubt, open the luggage.

14.6. Logout procedure

1. Logout can be achieved by the operator using the dedicated logout key on the panel. It is usually performed by checking the session time, possibly configured so that session time end is signalled and the presence of a replacement operator is ensured.
2. Always complete the analysis in progress. It is recommended that a user should never leave luggage displayed if it has not been analysed otherwise during hand over important information can be neglected, possibly affecting safety.
3. Logout can be automatic at the end of a session. If a properly configured session time is has been applied the light will blink red warning that the session is about to close.
4. Logout can be automatic, if properly configured, provided that the machine does not accept any more commands for a certain time period to be set.

15. Troubleshooting

Possible problems: how to act

1. LED “ready” on panel:
    a. If off: no power supply or the machine cannot be switched on; usually 1 minute and 30 seconds waiting between switching off and on; contact technical support for other cases.
    b. If red: machine malfunction: note any alarm displayed on the screen, continue with forced switch-off procedure and try switching-on again. If the problem persists, contact technical support.
    c. If red: during the training operating mode, the red LED is normal (indicating disconnection of acquisition physical part).
    d. If blinking red: it indicates that the system is trying to recover the malfunction, with 20-second execution time. The LED becomes green with the relevant indication of system ready (solved fault); if LED becomes red, follow the relevant procedure.
2. Disconnect power supply cable (220V): ensure that UPS is off by normal system switching-off procedure (key position to 0, LED ready switches off in about 1 minute and 30 seconds, LED switches on again): remove power supply cable (220V). If the procedure is not met, UPS could remain on, managing interruption like a network blackout with system on, with following abnormality; reconnect the power supply cable (220V), restart the system by placing the key in position 1 and when the login page is displayed, act like in forced switching-off procedure.
3. UPS management:
    a. network interruption, warned by an alarm message on the screen, the machine stops the conveyor handling and the X-ray emission;
    b. if the interruption lasts for more than 3 minutes, the machine switches off;
    c. to switch the system on again when the network is restored, the switching-off procedure must be performed (take the ignition key to position 0, check green LED switches on) and switch on as usual.
    d. If more than 3 3-minute-each interruptions occur in one hour, UPS batteries are discharged and must be charged again by leaving the machine on for 3 hours; if the machine is off with UPS batteries discharged, the machine must remain off and connected to the network for at least 30 minutes, before switching it on (minimum 5% UPS battery charge to switch on the system); please note that the complete battery charge requires at least 3 hours and can be made during normal system operation.
4. Cooling unit warning at switching-on: This can occur if the machine remains inactive for more than 8 hours at a temperature exceeding 30°C; in this case the system can be used making sure that the warning disappears after about 5 minutes from switch on (cooling system activation time); if the warning remains after 15 minutes it will become a cooling unit alarm and the machine will then switch off. In this case, contact technical support.
5. In the event of emergency button activation, after the button is reset the system requires 10 seconds to be restored.
6. If emergency buttons repeatedly activate in a short time, the system will switch off; it should be switched on again from a forced switch-off.
7. Warning present: yellow LED on the screen: operator can work with the system, but performance is not ensured. Follow any on screen instructions for warning messages and note any alarm code and description to be communicated to the technical support. If the warning persists after the system has been switched on again, contact technical support.
8. Alarm present: red LED on the screen: follow any on screen instructions for warning messages and note alarm code and description to be communicated to technical support.

The system cannot be used so switch it off (key to be placed on 0), try switching-on; if alarm persists, contact technical support.

9. In the event of image visual deformation, check the luggage is not trapped inside the tunnel and remove the obstacle; otherwise contact technical support.
10. In the event of handling error check no obstructions occur on conveyor belt or items trapped inside the tunnel or items weighing more than 160 Kg. Remove obstacle and switch on the machine again; if alarm persists, contact technical support.
11. Check that air exchange grids are always free from obstacles and clean, so that system forced ventilation expected is not hindered.
12. In the event of abnormal display, automatically adjust the video by pressing the AUTO key on the monitor. Do not manually adjust monitor brightness and contrast, unless the administrator is present to ensure proper basic settings for all operators.
13. If X-ray images are degraded such as:
    a. appearance of black stripes
    b. appearance of abnormal colour bands
    c. non-white background in colour monitor
    d. penetration and/or resolution loss
    e. generation of an abnormal number of explosive alarms, also on parts not concerning luggage
    f. presence of a vertical stripe with shaded edges
    g. presence of a black vertical stripe with sharp edges
    h. Check machine performance by STP test, and then contact technical support.
14. Presence of temporary strips on X-ray image, i.e. on little luggage: ensure that luggage is not forcedly inserted into the tunnel: it must enter tunnel transported by the proper belt.
15. Progressive decay of X-ray image during analysis: check proper spacing between luggage items (about 10 cm).
16. If the X-ray image displayed is not fluid, visually check the conveyor centring and contact technical support in case of abnormality.
17. In the event of image longitudinal deformation, contact technical support.
18. If a monitor switches off, ensure that the monitor is on, connecting cables are properly fastened (power supply and signal) to the monitor, then contact technical support
19. If the mouse or the panel do not operate properly, in terms of commands not performed, contact technical support.
20. In the event of long inactivity period of machine, check warm-up is proportional to inactivity time.
21. If NETSERVER, which provides the clock automatic alignment on various systems, is not present, check the machine clock precision and contact administrator if correction is required.
22. In the event of a TIP (FTI) image abort message, the system insertion has not succeeded; analyse the luggage again and perform acquisition.
23. In the event of a session recall, session loading time is directly proportional to the number of images present and can sometimes become significant.
24. In RAM navigation of luggage images analysed earlier, remember that the memory buffer is 16-m tape.
25. In the event of a switch-on abnormality with the key switch on the panel not properly responding to switching-on procedure, switch off in emergency (3 seconds in position -1), remove system power supply cable (220V) and, at the same time, put key in position 0 for at least 30 seconds (capacitors discharge), reconnect the power supply cable and continue with normal switch-on procedure.
26. In system switching-on phase, ensure a boot sequence exists and, after maximum 2 minutes, ensure login page is displayed, otherwise contact technical support, even if system has switched on again.

Index of figures