

HS-BEX/A



HELGESON SCIENTIFIC SERVICES S.A.
C/Valdemorillo 50F
28925 – Alcorcón (Madrid)

Tel.: 91 646 62 67 – Fax : 91 647 11 41
www.helgeson.es

The HS-BEXA monitors are multitasking equipment designed for the detection and measurement of Alpha + Beta radiation on the hands and feet of potentially exposed personnel through a fully automatic operation. An equipment that complies with the highest quality standards, designed and assembled in Spain.

It has 4 large-area alpha+beta plastic scintillation detectors. These are distributed according to 1 for the left hand, 1 for the right hand, for the left foot, for the foot right. The right hand detectors can be converted in "frisker" for manual sampling of different parts of the body, creating, in its standard configuration, 4 sensitive areas (1 left hand, 1 right hand, 1 left foot and 1 right foot) that work autonomously and independently, allowing simultaneous measurements with different levels of alarm, both individual and summative.

The equipment has sensors that detect when a person is correctly positioned, interrupting the current background reading and automatically initiating a thorough examination of the hands and feet of the subject.

While it is not being used, the equipment is continuously updating the background level information to compensate, the values obtained, when an actual measurement is made.

It has a color TFT touch screen of 8" and acoustic indicator that warn the user of the presence of radioactive particles in case of contamination, or of significant variations in the activity rate of the background where it is located.

This screen, in addition to showing in real time the availability of the equipment and all background values / subject / alarms etc., is also used to access the configuration and calibration menu via password.

The set is made of aluminum and steel painted for easy cleaning and decontamination.

The HS-BEXA has been designed to work at high speed, allowing the measurement of large groups of people in a short time.



Technical description:

- γ 2 detectors of 150x200x50 (0.25) mm (EJ212), beta plastic scintillation, with Mylar entry window with a selectable density of 0.9 mg / cm² or 2.7 mg / cm², on integral support PMMA, with a total thickness of 40 mm, each, for hands. In the HS-BEX / A, each detector incorporates a 0.25mm ZnS (Ag) sheet for Alpha detection. Each detector includes its PMT and HV source.
- γ 2 detectors of 150x350x50 (0.25) mm (EJ212), beta plastic scintillation, with Mylar entry window with a selectable density of 0.9 mg / cm² or 2.7 mg / cm², on integral support PMMA, with a total thickness of 40 mm, each, for feet. In the HS-BEX / A, each detector incorporates a 0.25mm ZnS (Ag) sheet for Alpha detection. Each detector includes its PMT and HV source.
- γ Efficiency for hand in contact: Am²⁴¹ 40%, Tc⁹⁹ 10%
- γ Efficiency for feet: Am²⁴¹ 35%, Tc⁹⁹ 9%
- γ 1 touch screen 8 "TFT-Color information and control
- γ Personal ID card reader (optional)
- γ Relay I/O connections
- γ Dynamic automatic calculation of measurement duration.
- γ Sensors for automatic detection of hands.
- γ Registration of events, backgrounds, measures, alarms, operation failures, etc.
- γ Digital parameter adjustment. (without potentiometers or mechanical actuators)
- γ Industrial PC and integrated hard disk with Windows 7/10 operating system.
- γ Includes all calibration routines, verification and configuration (alarms, levels, gain, etc).
- γ Customizable software in all its functions and languages.
- γ Remote operation (TCP / IP)
- γ It has standard RJ45 and USB ports for data download in any external USB support (memory stick, disk, etc.).
- γ Wide range of temperatures -5°C to + 55°C
- γ Relative humidity at 30°C up to 95%. Noncondensing.
- γ Power: 230 vac 50 Hz (can be adapted to other voltage requirements)
- γ Optimized design to facilitate maintenance.
- γ Fully adaptable according to each user's needs.
- γ Service guarantee, update and maintenance

General operation:

Internally, the HS-BEX / A behaves like 4 independent systems, it means each of its 4 detectors has its own high-voltage source, its preamplifier and its microprocessor card, all controlled, in all its adjustable parameters, from the internal PC software, so the user does not need any tool for the adjustments, from the high voltage value to the levels of gain, threshold, etc.

This characteristic allows to show, on the screen and in real time, the values, in each personal measurement, registered by each of the six detectors, of the sum value and of the established alarm levels, marking in color, in alarm case, the affected area. In the HS-BEX / A model, it shows on screen, and separately, the values corresponding to the measure "ALPHA", "BETA", summations and associated alarm levels.

This also makes the HS-BEX/A a long working time equipment since partial damages don't affect the total integrity of the equipment and can still working. Many manufacturers, in order to cut costs, install only one HV source and electronic set for the entire detector. If the HV source is damaged, the whole system shutdowns and cannot work. The HS-BEX/A can operate continuously till the damage detection system is replaced, what minimizes the impact in end user's operations.

The hands measurement can be performed by a two-steps analysis of 5 seconds each if palm and back wants to be monitored. In the first step, the palms of both hands are checked for alpha+beta contamination. In the second step, alpha+beta contamination is checked for the backs.

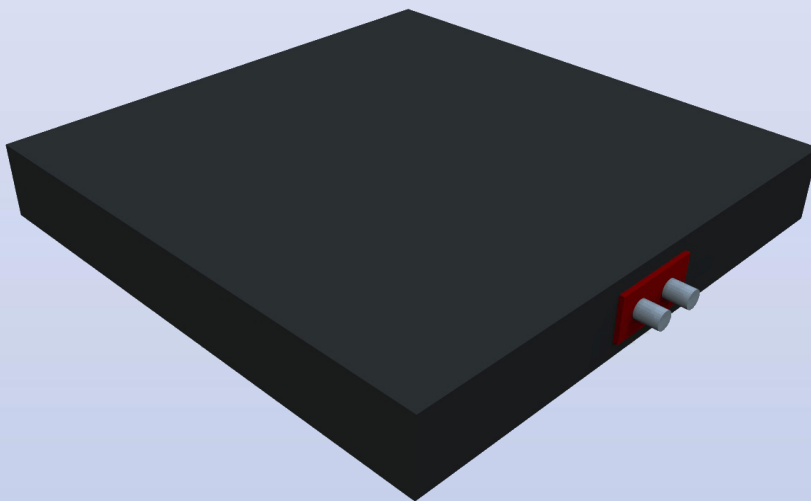
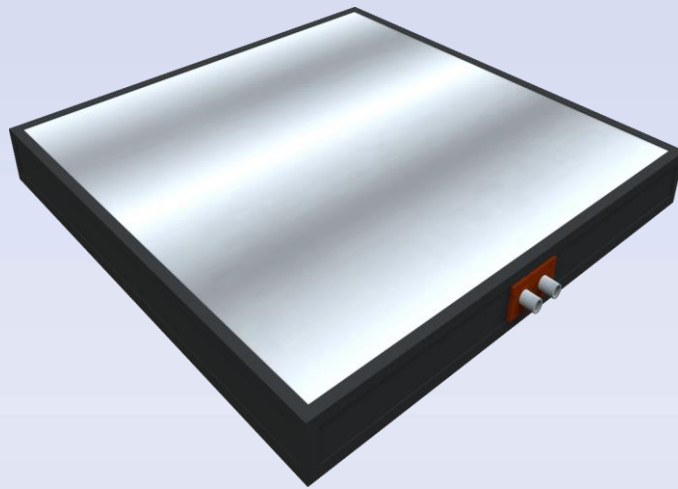
The different electronic modules are the same, with extensive experience of use, which are used in all Helgeson systems, such as OTM, HS-GAM, HS-RAM, MOS, etc., being interchangeable with each other.



Detectors:

The type of detector that the HS-BEX/A equipment incorporates is plastic scintillation. This type of detector consists of a thin layer (0.5mm / 0.25mm) of transparent material (plastic) doped with a sensitive organic molecule (p-bis [2- (5-phenyloxazolyl)] benzene). This layer is attached to a block of PMMA that serves as a light guide to the photomultiplier, already integrated inside. The entry window is aluminized with mylar (0.9mg / cm² or 2.7mg / cm²).

In the HS-BEX / A model, and for ALPHA detection / differentiation, the detectors also incorporate a 0.25mm silver-doped Zinc Sulfide scintillation sheet (ZnS (Ag)). They do not require gas PR for operation. For gamma detection, plastic scintillators are used in order to detect the gamma radiation from hand and feet.



Electronic and software configuration:

The equipment include an 8 "TFT color touch screen that shows, in real time, all background values, subject, alarms, etc., warning the user of the presence of radioactive particles in case of contamination or variations significant in the activity rate of the background where they are located.

This screen also allows, through the use of a password, access to the various calibration menus, settings and equipment configuration.

No peripheral connection or equipment is necessary for the normal operation.

The equipment has an additional protection system by password, which cancels the option of manipulating the screens by outsiders.

The management and control of HS-BEX and HS-BEX / A equipment is carried out through the HS-RAD application, a powerful intuitive, flexible and scalable tool thanks to its modular structure, developed for Windows WP / 7/10.

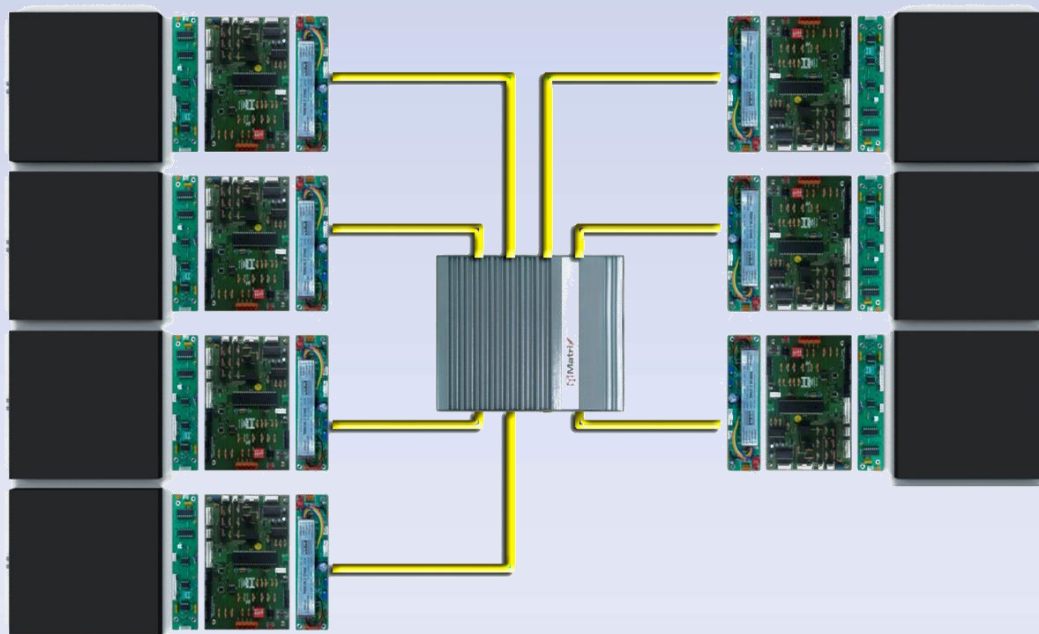
The control of the electronics is in charge of a rugged industrial computer Matrix series without fan, based on an Intel Core processor.



It has a temperature tolerance from -20 °C to 70 °C (SSD version) and resistance to vibrations up to 5G.



The computer centralizes communications with the controller cards associated with each detector. These manage the high voltage modules and pre-amplifiers and are responsible for the data acquisition task.



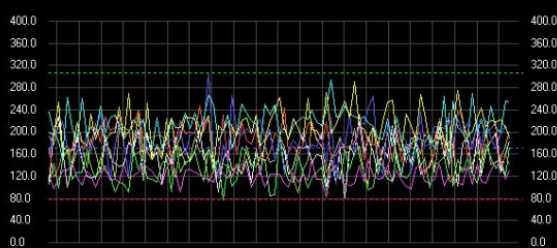
All the electronic adjustments, corresponding to the acquisition (thresholds, gain, high voltage, etc.), are made through the presence of digital potentiometers controlled from the tools available in the software itself.

AJUSTE ELECTRONICO

	THRESHOLD	GANANCIA	HV	FACTOR HV	SENSOR HV	CPS	CLK
DET#1	2500	500	790	1	828	183	1
DET#2	2500	500	800	1	830	201	1
DET#3	2500	500	800	1	833	141	1
DET#4	2500	500	780	1	792	172	1
DET#5	2500	500	780	1	802	186	1
DET#6	2500	500	890	1	913	254	1
DET#7	2500	500	850	1	898	130	1

Seleccionar perfil:

N° COL.:
 NORMAL



400.0
360.0
320.0
280.0
240.0
200.0
160.0
120.0
80.0
40.0
0.0

--- MEDIA: 170.22 --- V. MÁX: 306 --- V. MÍN: 77 σ : 42.17 Δ : 229

Voice notifications:

A voice synthesizer module has been incorporated to allow the user to personalize the messages that will be heard by the loudspeaker.

Through this tool you can write a voice message for each of the different events available in the application, and indicate how many times it should be played.

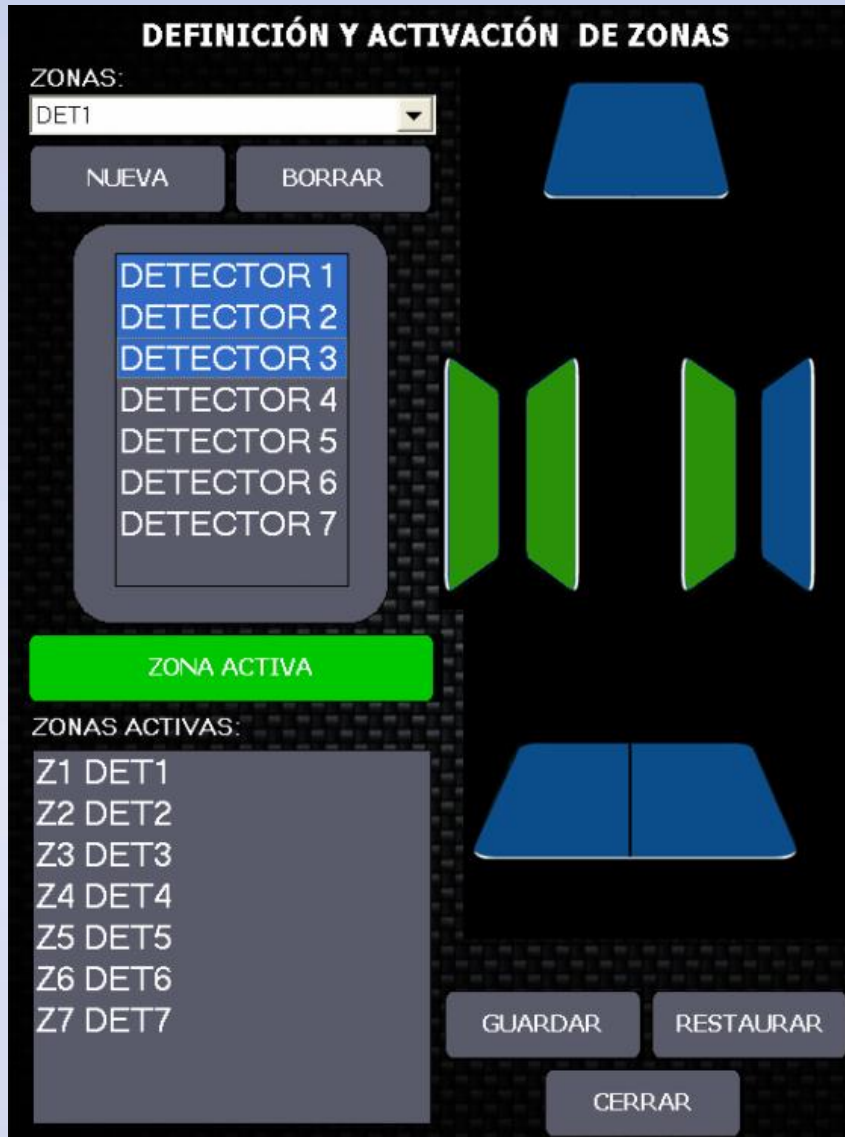
You can also set the dictation speed and choose between different voices available (male and female).

MENSAJES DE VOZ			
PÁGINA 1		PÁGINA 2	
EVENTO	TEXTO	REPETIR	
AL INICIAR LA APLICACIÓN	EQUIPO INICIÁNDOSE	0	ESCUCHAR
DIAGNÓSTICO DE COMUNICACIONES:	REALIZANDO CHEQUEO DE COM	0	ESCUCHAR
CHEQUEO CONTROLADORA #	COMPROBANDO CONTROLADOR	0	ESCUCHAR
DIAGNÓSTICO SUPERADO:	TEST EN CONTROLADORA # COR	0	ESCUCHAR
DIAGNÓSTICO NO SUPERADO:	ERROR EN CONTROLADORA #	0	ESCUCHAR
MODO DE OPERACIÓN SELECCIONADO:	MODO # SELECCIONADO	0	ESCUCHAR
PREPARANDO FONDO:	PREPARANDO MEDIDA DE FONDO	0	ESCUCHAR
INICIANDO FONDO:	INICIANDO MEDIDA DE FONDO	0	ESCUCHAR
FONDO COMPLETADO:	FONDO COMPLETO	0	ESCUCHAR
SUJETO APROXIMÁNDOSE DURANTE FONDO:	PASE, POR FAVOR	0	ESCUCHAR
SUJETO EN EL INTERIOR DURANTE FONDO:	ESPERE, POR FAVOR	0	ESCUCHAR
PREPARANDO CONTAJE:	SE VA A INICIAR LA MEDIDA	0	ESCUCHAR
SUJETO APROXIMÁNDOSE DURANTE CONTAJE:	PASE, POR FAVOR	0	ESCUCHAR
CUENTA ATRÁS DURANTE CONTAJE #:	#	1	ESCUCHAR
CONTAJE FINALIZADO:	SALGA, POR FAVOR	0	ESCUCHAR

VOZ SELECCIONADA:	VELOCIDAD:
Carmen	VELOCIDAD 3

Detection area definition:

An area can be defined including one or more detectors. As many areas as necessary can be created.



Each area, which groups several detectors, will be considered as a single detector whose surface will be the sum of all the surfaces that integrate it.

The final result will also be taken as the activity integral of all the detectors. The user can then define alarm thresholds independently for each zone.

Timing configuration:

The user can preset the measurement times, response times of sensors and other timers of the system. For the duration of measurements, absolute time values can be set or calculated in real time according to rules established by the user.

CONFIGURACIÓN DE TIEMPOS

MEDIDAS			SENSORES		SISTEMA	
CÓD.	VALOR	DESCRIPCIÓN	CÓD.	VALOR	DESCRIPCIÓN	
[FA]	254	FONDO ACTUAL (CPS)	[EF]	0.16	EFICIENCIA CALIBRACIÓN ACTIVA	
[FC]	187	FONDO CALIBRACIÓN	[LA]	0	LECTURA ACTUAL (CPS)	
[CT]	3184	CUENTAS TOTALES CALIBRACIÓN (CPS)	[FM]	0	FONDO MEDIO (CPS)	
[KA]	4	ESTADÍSTICO FALSA ALAR.	[KB]	2	ESTADÍSTICO CONFIANZA ALAR.	

LOS CÓDIGOS REPRESENTAN VALORES MEDIOS DE TODAS LAS ZONAS

MACROS DISPONIBLES:

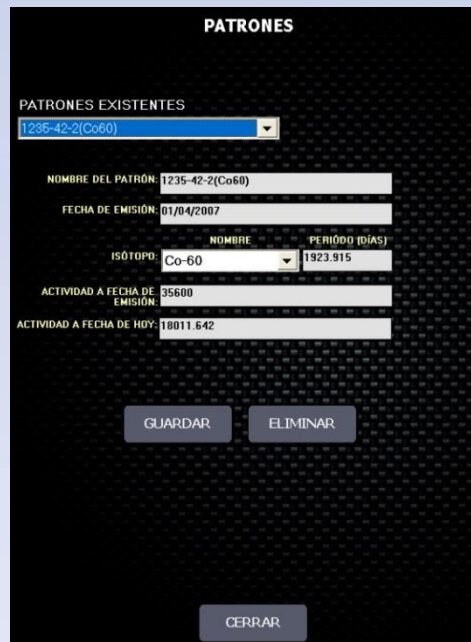
[IDZONA.XX]	VALOR DE UNA ZONA DETERMINADA	[MAX.XX]	VALOR MÁS GRANDE DE TODAS LAS ZONAS	[MIN.XX]	VALOR MÁS PEQUEÑO DE TODAS LAS ZONAS
-------------	-------------------------------	----------	-------------------------------------	----------	--------------------------------------

	REGLA	VALOR
DURACIÓN MEDIDA FONDO (SG): [TF]	300	300
DURACIÓN MEDIDA CONTAJE SIMPLE (SG): [TC]	$\frac{([KA]*SQRT([FA])+[KB]*SQRT(100+[FA]))}{100}^2$	1.03
DURACIÓN MEDIDA CONTAJE DOBLE (SG):	$\frac{([KA]*SQRT([FA])+[KB]*SQRT(100+[FA]))}{100}^2$	1.03
PAUSA ENTRE CONTAJES (SG):	5	5
PAUSA ENTRE FONDOS (SG):	5	5
DURACIÓN MEDIDA CALIBRACIÓN (SG):	5	5
DURACIÓN MEDIDA VERIFICACIÓN (SG):	3	3
FONDO MEDIO DINÁMICO (SG):	3	3
CICLO DE REGISTRO DE FONDO (SG):	100	100
TIEMPO MÍNIMO DE ALARMA ACTIVA (SG):	20	20

GUARDAR
CERRAR

Calibrations:

The equipment can be calibrated to report activities. For this, a module is available to register patterns (calibration sources), which will be used in the calibration process.



PATRONES

PATRONES EXISTENTES
1235-42-2(Co60)

NOMBRE DEL PATRÓN: 1235-42-2(Co60)

FECHA DE EMISIÓN: 01/04/2007

ISÓTOPO: Co-60 PERÍODO (DÍAS): 1923.915

ACTIVIDAD A FECHA DE EMISIÓN: 35600

ACTIVIDAD A FECHA DE HOY: 18011.642

GUARDAR ELIMINAR

CERRAR

Each zone is calibrated individually, and even different patterns can be used in each of them.



CALIBRACIONES

ZONA: DET1

ID	FECHA	PATRÓN	ACTIVA
120504133743	04/05/2012	235-42-2(Co60)	DN

NUEVA ACTIVA ELIMINAR

CALIBRACIÓN ID: 120504133743

PATRÓN: 1235-42-2(Co60) ISÓTOPO: Co-60

FECHA DE CALIBRACIÓN: 04/05/2012 ACTIVIDAD EN FECHA: 18213.947

ADQ FONDO ADQ FUENTE

CPS_FONDO	CPS_CONTAJE	CPS_NETAS
194	3094	2300

EFICIENCIA: 0.159

OBSERVACIONES:

OPERADOR:

GUARDAR CERRAR

3094

D1

Thresholds and alarms:

One of the most powerful tools that the HS-BEX and HS-BEX / A devices possess is the configuration section of the alarm thresholds.

This module allows you to create as many alarms (rules) as you wish, individually for each defined zone (group of detectors). The rules can be specified in absolute values, or relative to the readings of the equipment. These alarms can be set considering a “floating background”, it means that the alarms can be fixed to a certain value or adapted to the existing background, which is really useful in nuclear environments.

Temporary factors can be used when designing the rule (for example, defining an alarm threshold from 7 to 10 in the morning and a different one for the rest of the day). In addition, the voice message that is heard over the speakers can be customized when a rule is met.

UMBRALES DE DECISIÓN Y ALARMA

DET1

[FC] 194	FONDO CALIB. ACTIVA (CPS)	[FA] 165	FONDO ACTUAL (CPS)	[Ka] 5	ESTADÍSTICO FALSA ALAR.
[CT] 3094	CPS TOTAL CALIB.	[LA] 165	LECTURA ACTUAL (CPS)	[Kb] 1	ESTADÍSTICO CONFIANZA ALAR
[EF] 0.159	EFIC. CALIB. ACTIVA	[TC] 3	TIEMPO CONTAJE (SG)	[TF] 10	TIEMPO FONDO (SG)
[FM] 159	FONDO MEDIO (CPS)	10	NÚMERO DE MUESTRAS PARA FONDO MEDIO		

NOMBRE	REGLA	PROCESO	ACTIVA
FONDO BAJO	[FA]<50	FONDO	OFF
FONDO ALTO	[FA]>100	FONDO	ON

NOMBRE: FONDO ALTO

PROCESO: FONDO

REGLA: [FA]>100

ALARMA: ON

REGISTRAR: ON

MENSAJE DE VOZ: FONDO POR ENCIMA DEL UMBRAL

ESCUCHAR: ESCUCCHAR

REPETIR: 1 **PAUSA(SG):** 2

EVAL.:

AÑADIR
ELIMINAR

REPLICAR PARA TODAS LAS ZONAS
RESTAURAR REGLAS DE ORIGEN

GUARDAR
RESTAURAR
CERRAR

Data storage and access control:

The software includes user access control routines, as well as security levels to access certain options (calibrations, patterns, security options, electronic adjustments, templates, application closure, etc.).

In addition, it stores the actions that are performed together with the date and time.

They are also included background activity routines and measures such as alarms exceeded; notes entered by the user and automated activities carried out by the equipment.

REGISTRO DE ACCESOS Y SEGURIDAD

CLAVE OFF CLAVE DE EQUIPO: REPITA LA CLAVE:

USUARIOS: ADMINISTRADOR

CLAVE OFF CLAVE NUEVA: REPITA LA CLAVE: NIVEL DE SEGURIDAD: NIVEL 01 ÚLTIMA FECHA DE ACCESO:

USUARIO	NIVEL	FECHA	HORA	ACCIÓN
ADMINISTRADOR	1	01/06/12	11:59:45	DESBLOQUEAR EQUIPO
ADMINISTRADOR	1	01/06/12	12:02:29	DESBLOQUEAR EQUIPO
ADMINISTRADOR	1	01/06/12	12:48:03	DESBLOQUEAR EQUIPO
ADMINISTRADOR	1	01/06/12	12:57:13	DESBLOQUEAR EQUIPO
ADMINISTRADOR	1	01/06/12	13:01:01	CAMBIAR AJUSTES BARRERAS
ADMINISTRADOR	1	01/06/12	13:01:42	SALIR DE APLICACIÓN
ADMINISTRADOR	1	01/06/12	13:02:36	DESBLOQUEAR EQUIPO
ADMINISTRADOR	1	01/06/12	13:02:52	SALIR DE APLICACIÓN
ADMINISTRADOR	1	01/06/12	13:04:52	DESBLOQUEAR EQUIPO
ADMINISTRADOR	1	01/06/12	13:04:54	SALIR DE APLICACIÓN
ADMINISTRADOR	1	01/06/12	13:10:24	DESBLOQUEAR EQUIPO
ADMINISTRADOR	1	01/06/12	13:33:43	DESBLOQUEAR EQUIPO
ADMINISTRADOR	1	01/06/12	13:33:45	SALIR DE APLICACIÓN
ADMINISTRADOR	1	01/06/12	13:47:12	DESBLOQUEAR EQUIPO
ADMINISTRADOR	1	01/06/12	13:47:14	SALIR DE APLICACIÓN
ADMINISTRADOR	1	01/06/12	13:49:46	DESBLOQUEAR EQUIPO
ADMINISTRADOR	1	01/06/12	13:49:55	SALIR DE APLICACIÓN
ADMINISTRADOR	1	01/06/12	14:30:24	DESBLOQUEAR EQUIPO

FILTRAR POR:

USUARIO: FEC. ENTRE: Y: 01/06/12 04/06/12 HORA ENTRE: Y:

NIVEL DE SEGURIDAD: TIPO DE ACCIÓN:

Data mangement:

All the data collected and reports generated by the application are accessible and exportable thanks to the file manager that it incorporates.

This tool allows end user to copy all the data to an external device (pendrive) that connects to the USB port of the device. In order to do that, simply access the folder containing the information you want to export and drag it over the window corresponding to the storage unit.

