Reply to Letter Dated June 29, 2011

ENVI Application for New Exempt Device Registration and Amendment to Exempt Distribution License

Environics

July 27, 2011

NRC Original Copy

Prepared By:

IRSC

International Radiation Safety Consulting, Inc.

Environics

July 28, 2011

Richard K. Struckmeyer
Licensing Branch
Division of Materials Safety and
State Agreements Office of Federal & State Materials &
Environmental Management Programs
U.S. Nuclear Regulatory Commission
1 While Flint North
11555 Rockville Pike
Rockville, MD 20852-2738

RE: ENVI Application for new exempt device registration and amendment to exempt distribution license

Docket No. 030-37898

Dear Mr. Struckmeyer:

Enclosed please find our reply to your letter dated June 29, 2011. For your convenience we have listed your questions for reference with our reply.

Sean Chapel of International Radiation Safety Consulting, Inc. (IRSC) is our radiation safety consultant and is authorized by us to discuss this reply with you.

If you have any questions please call me at 410.612.1250 or email me at rolf.meinholtz@environicsusa.com.

Sincerely,

Rolf Meinholtz
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Enclosure

Request for Additional Information for the ENVI Series Industrial Detectors

A. *Questions related to the sealed source and device registration certificate application*

1 *Please provide a final version of the manual for the series. Please note that the information submitted for review should be final and that no further changes will be done.*

Please see the final version of the manual as Attachment A. We have updated the manual to include information for the customer on returning the product to Environics at the end of its useful life or for disposal as normal waste.

2. *In your application you state that the device has not significantly changed. Please explain that statement. Also, please clearly identify the modifications done to the device model IMS 5000 (i.e. dimension, construction, materials).*

Our application is based on the previous registration for the Drager Safety IMS 5000, US NRC device registration NR-8199-D-810-E. The product is being produced by the same manufacturer in Germany. The only modifications are that the activity of the source used has been reduced to 300MBq, and the housing of the unit has been reconfigured.

To confirm, the dimensions are as follows:

ENVI-Air 280mmx100mmx280mm (11in.x4in.x11in.)

ENVI-Stack 280mmx100mmx280mm (11in.x4in.x11in.)

ENVI-Pro 280mmx100mmx280mm (11in.x4in.x11in.)

NEMA-4X-500mm x 400mm x 151mm (19.69in. x 15.79in.x 5.95in.)

"Type 4X Enclosures are constructed for either indoor or outdoor use to provide a degree of protection to personnel against access to hazardous parts; to provide a degree of protection of the equipment inside the enclosure against ingress of solid foreign objects (windblown dust); to provide a degree of protection with respect to harmful effects on the equipment due to the ingress of water (rain, sleet, snow, splashing water, and hose directed water); that provides an additional level of protection against corrosion; and that will be undamaged by the external formation of ice on the enclosure."

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As seen in the "Materials exposed to sample list" in the end of Attachment B 'Technical Drawings' none of the materials have changed from the original registration for the Drager Safety IMS 5000, US NRC device registration NR-8199-D-810-E.

3. *In your application you stated that the ENVI Series consist of three models: ENVI-Air, ENVI-Pro, and ENVI-Stack. Please provide clarification on how you wish the products to be registered, specifically if you want them to be registered as ENVI series or each model individually.*

   We wish to list the ENVI-Air, ENVI-Stack, and ENVI-Pro as a series.

4. *Please provide engineering drawings of the device preferably showing different views of the assembly. Please include dimensions of the device and the ion chamber. The drawings should be legible, and show/identify the components. The drawings in Attachment B and C are not legible and do not meet the provisions of 10 CFR 2.390 to warrant proprietary classification. For guidance on engineering drawings, please refer to NUREG 1556 Vol. 3, Rev. 1, Section 6 "How to file", page 6-2. If you wish to request proprietary classification for the drawings that you will submit to us, please state in a notarized affidavit, how the drawings meet the provisions of 10 CFR 2.390(b)(4).*

   Enclosed are more detailed technical drawings showing the product from different perspectives.

   We wish to declare any drawings listed as "Strictly Confidential" or "Proprietary" as being withheld from pubic view under 10 CFR 2.390(b)(4).

5. *Please provide an electronic copy of the device drawing suitable for inclusion in the registration certificate.*

   We are emailing you electronic copies of all drawings.

   Please provide a drawing of the NEMA 4X, outdoor enclosure, and explain how this will be installed and who will be responsible for the installation of the outdoor enclosure.

   Enclosed is a drawing of the NEMA 4X as Attachment B. Suggested installation instructions of the outdoor enclosure have been included as a part of the manual.

   Please explain what prototype tests were conducted and provide the results of the tests. If you wish to refer to prototype tests which had been conducted on the Model IMS 5000,

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under the previous registration NR-8199-D-810-E, please demonstrate how the test results apply to the ENVI-series and to the product distributed by Environics.

Enclosed is a copy of the prototype testing report for the ENVI Series as Attachment C. Also enclosed is the wipe test certificate verifying that no contamination was present after testing was completed as Attachment D.

We have requested a copy of the original prototype testing data for the IMS 5000 from the NRC. When we receive this information we will provide it to you.

We have also enclosed a copy of previous regulatory approval documents of the IMS 5000 issued by the German National Metrology Institute (PTB) as Attachment E, and the type approval issued for the IMS 5000 by the Berlin Radiation Protection Agency as Attachment F. Additionally we have enclosed an operational test report as Attachment G.

B. Questions related to the exempt distribution license application

The information requested in the following paragraphs is required by Title 10, Code of Federal Regulations, Chapter 32. Each paragraph is derived from a section within this chapter.

1. *Section 32.26(b)(3) requires the applicant to submit information concerning the chemical and physical form of the byproduct material in the product and changes in chemical and physical form that may occur during the useful life of the product. Your application provided information concerning the chemical and physical form of the byproduct material, but it did not appear to contain information concerning changes in chemical and physical form that may occur during the useful life of the product. Please provide this information.*

   The source within the ENVI Series will not degrade significantly during the useful life of the product. Only a small fraction of the sample is processed through the drift tube in the Ion Mobility Spectrometer. It is a dry gas sample stream. The source resists corrosion due to a silica seal. In the unlikely event that any material would be leached from the source, a specially designed Pt scrubber would collect the material before it could be vented. This Platinum scrubber is returned to the manufacturer for recharging during the maintenance cycle. This scrubber is a steel cylinder that is sealed by welding and has a custom inlet/outlet port to prevent accidental access to the contents by the user.

2. *Section 32.26(b)(4) requires the applicant to submit information concerning the solubility in water and body fluids of the forms of the byproduct material contained in the product. Your application did not appear to contain information concerning the solubility in water*

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and body fluids of the forms of the byproduct material. Please provide this information.

H-3 is readily soluble in water or body fluids and bonds with oxygen to form water based compounds. It has a short biological half-life and for the most part is flushed from the body relatively quickly. Organically bounded tritium can remain in the body for a longer time. H-3 has a low radiotoxicity level as per the Radiological Health Handbook, 2nd Edition. Gaseous tritium is more radiotoxic than tritium water based compounds.

3. *Section 32.26(b)(8) requires the applicant to submit information concerning the total quantity of BPM expected to be distributed annually. Your application did not appear to contain information concerning the total quantity of BPM expected to be distributed annually. Please provide this information.*

   Environics intends to ship about 100 devices per year for a total activity of 810 millicuries (30GBq).

4. *Section 32.26(b)(10) requires the applicant to submit information concerning the proposed method of labeling or marking the product and its point of sale package to satisfy the requirements of §32.29(b). Appendix F shows a copy of the "Point of Sale Package Label" on the first page, and another label on the second page. The purpose of the second label was not stated; however, it appears to be the label intended for placement on the device. Please clarify how you will satisfy the requirement of Section 32.26(b)(10). The response to this item may be provided in conjunction with item 7 in Part A of this enclosure.*

   We confirm that the second label is the device label.

5. *Section 32.26(b)(11) requires the applicant to submit information concerning the procedures for prototype testing (containment, shielding and other safety features) under both normal and severe conditions of handling, storage, use, and disposal of the product. Your application did not appear to contain information concerning the procedures for prototype testing. Please provide this information. The response to this item may be provided in conjunction with item 8 in Part A and item 6 in Part B of this enclosure.*

   Enclosed is a copy of the prototype testing report for the ENVI Series as Attachment C.

6. *Section 32.26(b)(12) requires the applicant to submit information concerning the results of prototype testing including any change in form, extent of release to environment, increase in radiation levels and changes in safety features. Your application did not appear to contain information concerning results of prototype testing. Please provide this information. The response to this item may be provided in conjunction with item 8 in Part A and item 5 in Part B of this enclosure.*

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Also enclosed is the wipe test certificate as Attachment D verifying that no contamination was present after testing was completed.

7. *Section 32.26(b)(15) requires the applicant to submit information concerning the quality control procedures followed in fabrication of production lots of the product and the quality control standards product must meet. Appendix J of your application contained certificates which you describe as ISO 9001 and AQAP 2110 certification; however, your application did not appear to contain information concerning Quality Control procedures as required by Section 32.26(b)(15). Please provide information concerning the quality control procedures followed in fabrication of production lots of the product and the quality control standards product must meet.*

Please see Attachment H for Environics' USA current Quality Assurance Program. Our QA program was previous approved for exempt distribution of the M90 and ChemPro products distributed by Environics USA.

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Index of Attachments

Environics Reply

July 26, 2011

Attachment A-Final Version of the Operator's Manual.

Attachment B- Technical Drawings

Attachment C- Prototype Testing Report

Attachment D- Leak Test Certificate

Attachment E- Regulatory approval documents of the IMS 5000 issued by the German National Metrology Institute (PTB)

Attachment F- Type approval issued for the IMS 5000 by the Berlin Radiation Protection Agency

Attachment G- Operational Test Report

Attachment H- Environics Quality Assurance Program

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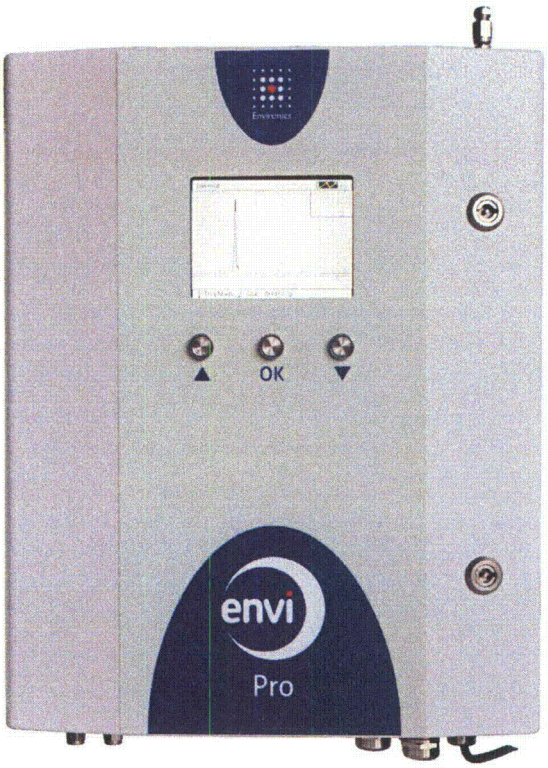
AVERY READY INDEX 600089

ENVI™ analyzers

ENVI-Air™, ENVI-Pro™ and ENVI-Stack™

User Manual



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EDxxxxx Rev. 1.0

July 26. 2011

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1. PRODUCT OVERVIEW

1.1 Introduction

The ENVI™ Series product line includes analyzers which are able to detect gas compounds in ambient air (ENVI-Air™), stack gas (ENVI-Stack™) or process gas (ENVI-Pro™).

NOTE: All **19" Rack-Mount Systems** of the ENVI™ Series Product Line include backup batteries in case of power outages.

1.2 ENVI™ Analyzers Product Line

1.2.1 ENVI-Air™

The ENVI-Air™ analyzer from Environics-IUT is a continuously operating gas analyzer designed for low to ultra-low level detection of either single or multi-component gases in ambient air. It can be installed indoors in the standard rack mount enclosure or outdoors in the NEMA 4x enclosure. The analyzer is designed for un-attended operation and minimal user maintenance. All ENVI-Series™ enclosures are rated for general purpose use but can be equipped with an optional purge system for operation in hazardous locations up to Class-1 Division-1.

1.2.2 ENVI-Pro™

The ENVI-Pro™ analyzer from Environics-IUT is a fully customizable continuous process gas monitoring unit that is designed to measure low-level contaminants that can affect the efficiency of an industrial gas process. It can detect and react in real-time to concentration fluctuations that might impact the processing efficiency, feedstock utilization, catalyst poisoning or downstream corrosion. The ENVI-Pro™ is designed to continuously sample in sub-atmospheric, atmospheric or high pressure gas streams and in a wide variety of sample matrixes from hydrogen or hydrocarbon blends to ambient air. ENVI-Pro™ process gas analyzers can be integrated with the full range of available sample pre-treatment systems including thermal reactors, chillers, vaporizers or sample dryers to optimize the analyzer to the needs of the application.

1.2.3 ENVI-Stack™

The ENVI-Stack™ analyzer from Environics-IUT is the latest evolution in continuous emission monitoring (CEM) systems that offer turn-key, stack-to-analyzer solutions, based on IMS technology. The ENVI-Stack™ can be used with all standard dilution or non-dilution sampling systems. Small variations in concentrations of the stack output are easy to monitor and track since the ENVI-Stack™ analyzers use direct measurement based on the IMS detection system.

The ENVI-Stack™ analyzers are designed to perform with the highest degree of reliability and accuracy when measuring HAPS such as ammonia, chlorine, phosgene, HCN, HCl, HF, chlorine dioxide and other chemicals with the minimum down time and low consumable or user maintenance requirements.

1.3 For Your Safety

Strictly follow the Instructions for Use

Any use of the analyzers requires full understanding and strict observation of these instructions. The analyzers are only to be used for purposes specified here.

Liability for proper function or damage

The liability for the proper function of the instrument is irrevocably transferred to the owner or operator to the extent that the instrument is serviced or repaired by personnel not employed or authorized by Environics-IUT Service or if the instrument is used in a manner not conforming to its intended use. Environics Oy cannot be held responsible for damage caused by noncompliance with the recommendations given above. The warranty and liability provisions of the terms of sale and delivery of Environics Oy are likewise not modified by the recommendations given above.

1.4 Safety Information

Pay attention to the specific safety information associated with the appropriate symbol:

⚠ **Warning:**

A WARNING calls attention to a condition or possible situation that could cause injury to the operator or that could damage or destroy the product.

1.4.1 Radioactive Material

⚠	**Ionization source** The IMS detector uses a weak β source for ionization. The radioactive material cannot leave the sealed source housing or the scrubbers/filters that are internal to the analyzer.
⚠	**The device contains a small ionization source that uses Tritium (H3) with an activity level of 8.1 mCi or (300 MBq.) The analyzer is licensed as an Exempt distributable item in the US under license # XXXXXXXXXXXXXXXX and may be purchased and used without the need for a radioactive possession license.**

1.4.2 Electrical Safety

⚠	**Do not remove any part of the housing** The analyzer internal electronics employs voltages as high as 2000 V. Do not remove outer covers, since touching the inner parts may be dangerous!
⚠	**Electric overload** Use only electrical power that meets the specifications of the analyzer. Damage to the analyzer is possible if the power specifications are exceeded.

1.4.3 Operating Conditions

⚠	**Operating in explosive atmospheres** 19" Rack-Mount System: Is not designed for use in an explosive atmosphere. The 19" rack mount device is not equipped for such applications and explosions may occur. Industrial Enclosure (NEMA 4X): Is designed for use in harsh or explosive atmospheres but for safe use the enclosure MUST be connected to an appropriate inert gas purge system.
⚠	**Operating temperature ranges** 19" Rack-Mount System: 0 to +50°C (32 to +122°F). Industrial Enclosure (NEMA 4X): -40 to +50°C (-40 to +122°F).
⚠	**Operating relative humidity** 0-90% (non-condensing).
	During operation there is a constant 250 ml/min air flow through the device. If the device is connected to another gas system, this flow must be maintained. Otherwise the devices entrance system may be damaged or destroyed.
⚠	Avoid handling the detector's inlet area, because your hands may be contaminated.
⚠	19" Rack-Mount systems contain Lithium ion batteries Avoid short-circuiting the battery

1.4.4 Storage Conditions

⚠	**Storage temperature ranges** 19" Rack-Mount System: -20 to +50°C (-4 to +122°F). Industrial Enclosure (NEMA 4X) -40 to +50°C (-40 to +122°F). Recommended storage temperature range for all products is from +10 to +30°C (+50 to +86°F).
⚠	**Storage humidity ranges** Recommended storage relative humidity range for all products is from 0% to 90% (non-condensing).

⚠	Do not store the detector in areas where there are strong odors (e.g. with chemicals or cleaning supplies).

1.4.5 Disposal of the Analyzers

While the Envi series detectors are classed as US NRC 'exempt' and can be disposed of in the general waste stream it is preferred that the detector be returned to the manufacturer for end of use disposal. As such Environics-IUT will take back the Envi series products for proper disposal in the future with a nominal fee charged. The analyzer contains a small Tritium (H3) radioactive sealed source, as such it requires proper disposal. Please contact Environics-IUT for further information and assistance.

1.5 Items Included in Standard Delivery

The following items are included in standard delivery:

Table 1: Standard items, 19" Rack-mount system

NAME	DESCRIPTION
Analyzer	The Envi-Series detector
Power cable	Cable to connect the device with the power supply
Scrubber key	Special Scrubber removal tool to permit replacement of the internal scrubber cartridge.
Replacement scrubber set and seals.	One spare scrubber replacement set.
Spare Gas Inlet filter	Gas inlet filter.

Table 2: Standard items, Industrial enclosure (NEMA 4X)

NAME	DESCRIPTION
Analyzer	The Envi-Series detector
Door key	Custom latch key to open the housing of the device
Scrubber key	Special Scrubber removal tool to permit replacement of the internal scrubber cartridge.
Replacement scrubber set and seal rings.	One spare set of scrubbers and seal rings.
spare Gas Inlet filter	Gas inlet filter.

1.5.1 Optional Accessories

The following items are available as consumables/optional accessories – contact Environics-IUT for pricing and ordering information.

Table 3 Consumables and optional accessories

NAME	DESCRIPTION
Scrubber	Replacement scrubber for cleaning the detectors drift gas
Seals for the scrubber (2 pcs)	Seals for the scrubber
Communication Cable	Cable to connect the device with a PC (optional)

1.5 Key Components and Connection Elements

1.5.1 19'' Rack-Mount System

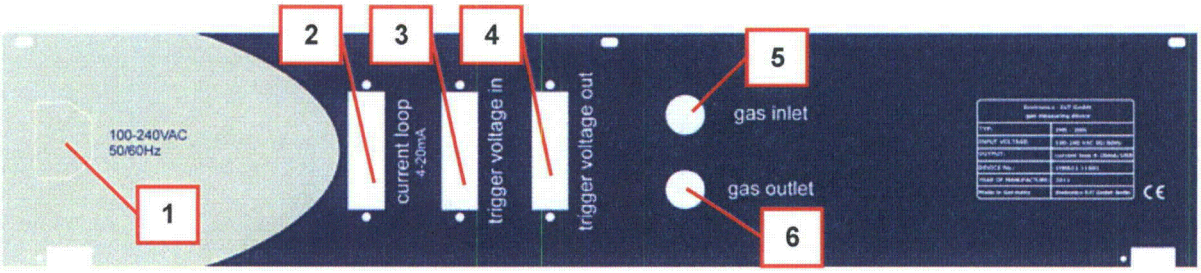


Figure 2: Connection elements, 19'' Rack-Mount system

Table 4 Connection elements, 19'' Rack-Mount system

1. Power connector, 110-240 VAC, 50/60 Hz.
2. Current loop connector (See table 6 for pin out specifications)
3. Trigger voltage in connector; (See table 6 for pin out specifications)
4. Trigger voltage out connector; (See table 6 for pin out specifications)
5. Sample input, supply atmospheric pressure sample in, minimum 250cc/min. flow. ¼" Swagelok fitting.
6. Sample output, exhaust to air or atmospheric pressure exhaust line. ¼" Swagelok fitting.

1.5.2 Industrial Enclosure (NEMA 4X)

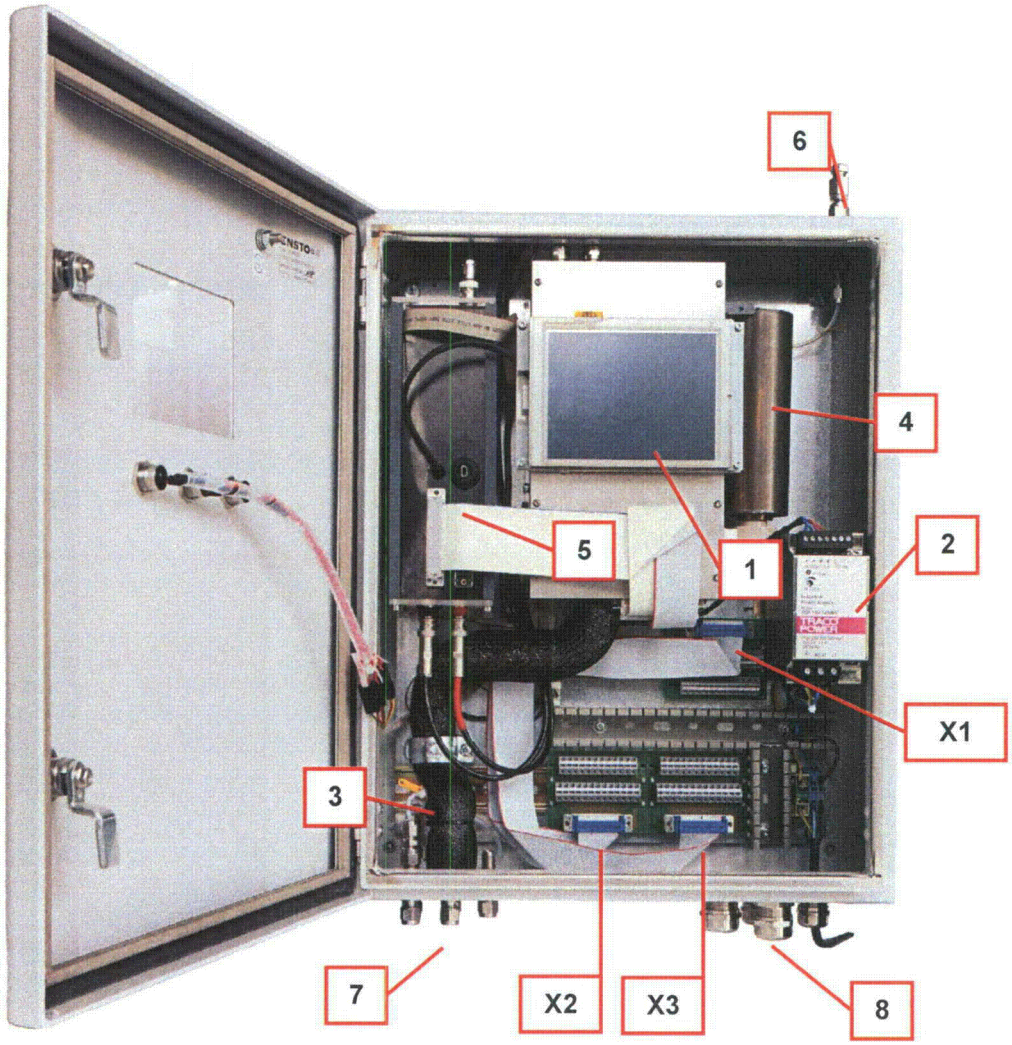


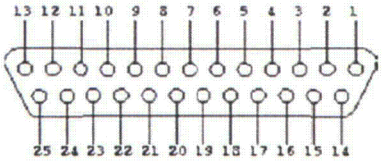
Figure 3: Key Components NEMA 4X– inner view

Table 5: Key Components NEMA 4X – inner view

1 Analyzer interface Display
2 Transformer
3 Heated hose
4 Scrubber
5 Electronic boards and the USB plug
6 Purge outlet (optional ¼" Swagelok fitting)
7 Connectors refers to Fig. 8
8 Cable gland refers to Fig. 7
X0 Power port
X1 Relay board trigger voltage in; (See table 7 for pin out specifications)
X2 Relay board trigger voltage out; (See table 7 for pin out specifications)
X3 Passive current loop 4-20 mA; (See table 7 for pin out specifications)

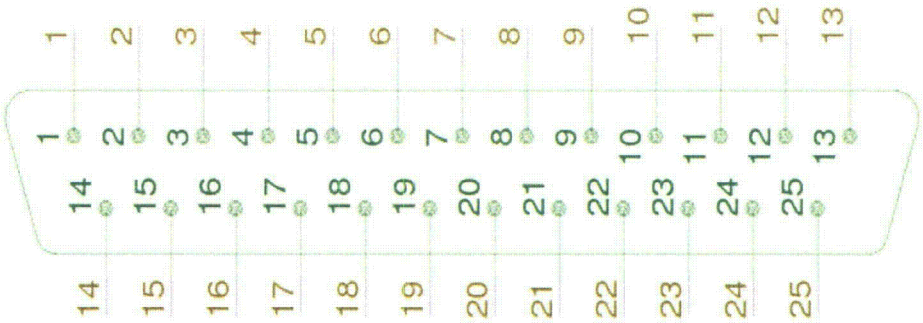
Table 6: relay board pin assignments Ver 4.0

Pin assignment



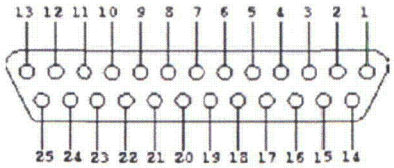
Relaysboard input (24 V)

Pin	discription	
1	Not Connected	
14	Relay 1 - (auto_sample)	White wire
2	Relay 1 + (auto_sample)	Orange wire
15	Not Connected	
3	Relay 2 + (span_calib)	Green wire
16	Relay 2 – (span_calib)	Red wire with black strip
4	Not Connected	
17	Relay 3 - (span_mon)	Green wire with black strip
5	Relay 3 + (span_mon	Black wire
18	Not Connected	
6	Relay 4 + (zero_mon)	White wire with black strip
19	Relay 4 – (zero_mon)	Red wire
7	Not Connected	
20	Relay 5 - (standby)	Red with white strip
8	Relay 5 + (standby)	Green with white strip
21	Not Connected	
9	Relay 6 + (bakeout)	Blue wire
22	Relay 6 – (bakeout)	Black with white strip
10	Not Connected	
23	Relay 7 - (trigger_sample)	Orange wire with black strip
11	Relay 7 + (trigger_sample)	Blue wire with black strip
24	Not Connected	
12	Relay 8 + (24 V_Trigger_voltage)	Violet wire with white strip
25	Relay 8 – (24 V_Trigger_voltage)	Yellow wire
13	Not Connected	



Relaysboard output (max. 24 V/ 6 A)

Pin	Beschreibung
1	Relay 1 – normal closed (internally connected, not usable)
14	Relay 1 – common (internally connected, not usable)
2	Relay 1 – nomal open (internally connected, not usable)
15	Relay 2 – normal closed (internally connected, not usable)
3	Relay 2 – common (internally connected, not usable)
16	Relay 2 – nomal open (internally connected, not usable)
4	Relay 3 – normal closed (High alert)
17	Relay 3 – common (High alert)
5	Relay 3 – nomal open (High alert)
18	Relay 4 – normal closed (Low alert)
6	Relay 4 – common (Low alert)
19	Relay 4 – nomal open (Low alert)
7	Relay 5 – normal closed (Fault)
20	Relay 5 – common (Fault)
8	Relay 5 – nomal open (Fault)
21	Relay 6 – normal closed
9	Relay 6 – common
22	Relay 6 – nomal open
10	Relay 7 – normal closed
23	Relay 7 – common
11	Relay 7 – nomal open
24	Relay 8 – normal closed
12	Relay 8 – common
25	Relay 8 – nomal open
13	Not Connected



current loops4 -20 mA

Pin	Beschreibung
1	Channel 1 + (CMME)
14	Channel 1 - (CMME)
2	Channel 2 +
15	Channel 2 -
3	Channel 3 +
16	Channel 3 -
4	Channel 4 +
17	Channel 4 -
5	Channel 5 +
18	Channel 5 -
6	Channel 6 +
19	Channel 6 -
7	Channel 7 +
20	Channel 7 -
8	Channel 8 +
21	Channel 8 -
9	Not Connected
22	Not Connected
10	Not Connected
23	Not Connected
11	Not Connected
24	Not Connected
12	Not Connected
25	Not Connected
13	Not Connected

Table 7: relay board pin assignments

X1			X2			X3	
Relay board input (24 V)			Relay board output (max. 24 V/ 6 A)			Current loop 4 -20 mA	
Pin	**Description**		**Pin**	**Description**		**Pin**	**Description**
1	Not Connected		1	Relay 1 – normal closed		1	Channel 1 +
2	Relay 1 +		2	Relay 1 – normal open		2	Channel 2 +
3	Relay 2 +		3	Relay 2 – common		3	Channel 3 +
4	Not Connected		4	Relay 3 – normal open		4	Channel 4 +
5	Relay 3 -		5	Relay 3 – normal closed		5	Channel 5 +
6	Relay 4 +		6	Relay 4– common		6	Channel 6 +
7	Not Connected		7	Relay 5 – normal closed		7	Channel 7 +
8	Relay 5 -		8	Relay 5 – normal open		8	Channel 8 +
9	Relay 6 +		9	Relay 6 – common		9	Not Connected
10	Not Connected		10	Relay 7 – normal closed		10	Not Connected
11	Relay 7 -		11	Relay 7 – normal open		11	Not Connected
12	Relay 8 +		12	Relay 8 – common		12	Not Connected
13	Not Connected		13	Not Connected		13	Not Connected
14	Relay 1 -		14	Relay 1 – common		14	Channel 1 -
15	Not Connected		15	Relay 2 – normal closed		15	Channel 2 -
16	Relay 2 -		16	Relay 6 – normal closed		16	Channel 3 -
17	Relay 3 +		17	Relay 3 – common		17	Channel 4 -
18	Not Connected		18	Relay 4 – normal closed		18	Channel 5 -
19	Relay 4 -		19	Relay 4 – normal open		19	Channel 6 -
20	Relay 5 +		20	Relay 5 – common		20	Channel 7 -
21	Not Connected		21	Relay 6 – common		21	Channel 8 -
22	Relay 6 -		22	Relay 6 – normal open		22	Not Connected
23	Relay 7 +		23	Relay 7 – common		23	Not Connected
24	Not Connected		24	Relay 8 – normal closed		24	Not Connected
25	Relay 8 -		25	Relay 8 – normal open		25	Not Connected
26	Not Connected		26	Not Connected		26	Not Connected

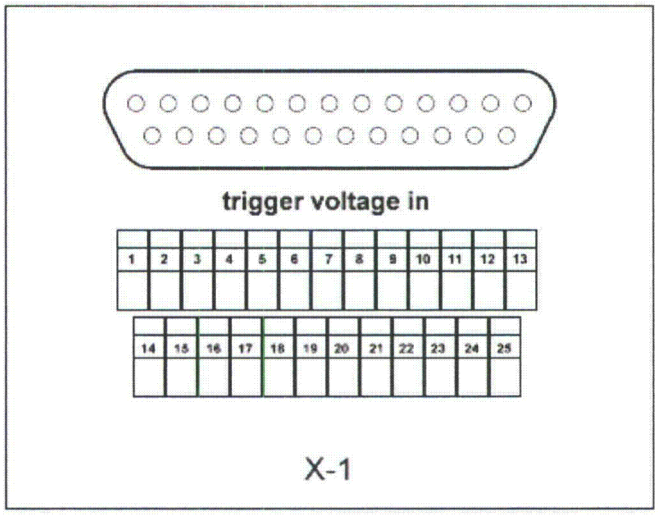


Figure 4: Allocation of the X1 trigger voltage input channels

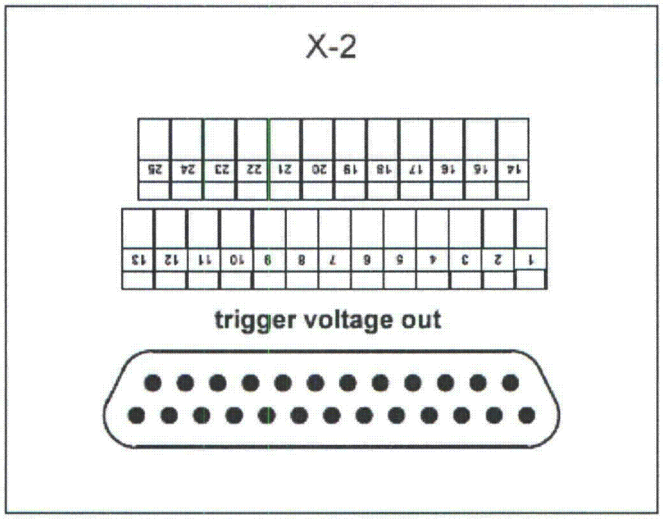


Figure 5: Allocation of the X2 trigger voltage output channels

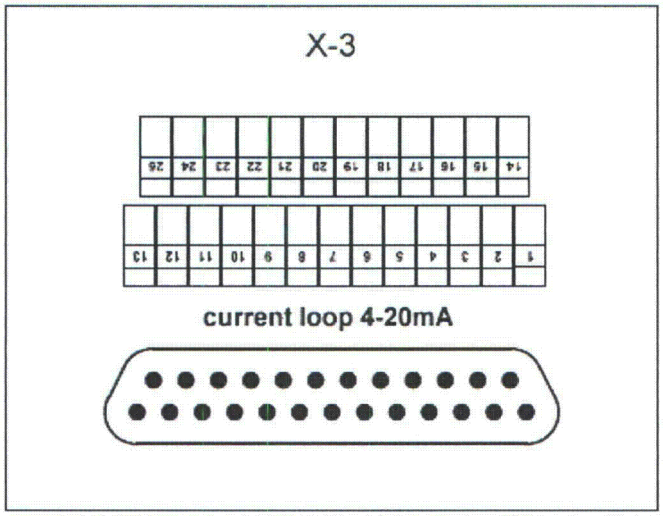


Figure 6: Allocation of the X3 passive current loop channels

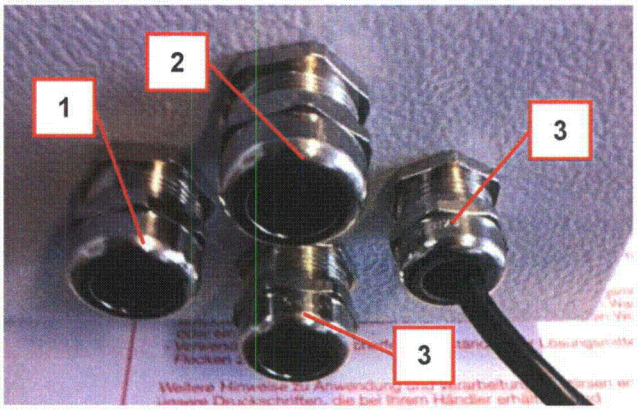


Figure 7 Cable glands NEMA 4X, bottom

Table 7: Connection elements, NEMA 4X

1-3	Relay cable gland ask fitter personnel for allocation
4	Cable gland for power cord

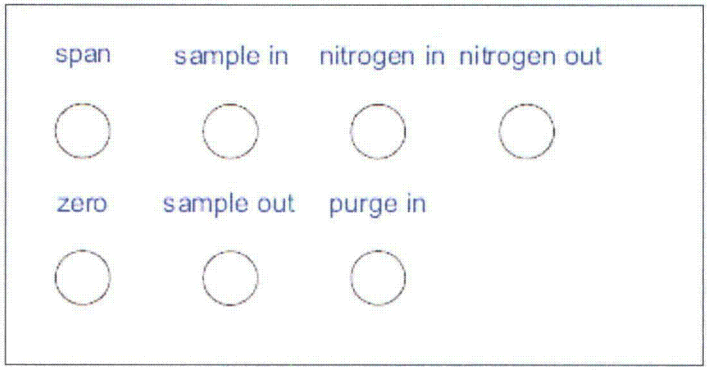


Figure 8: Connection elements NEMA 4X, bottom

1.6 Product Description

The ENVI-series™ analyzers from Environics-IUT are based on proven use of aspirated IMS technology developed by Environics and IUT and sold in their products for the last 20+ years. Ion Mobility Spectrometry (IMS) is a simplified atmospheric pressure time-of-flight technique that is highly selective with low ppb to % sensitivity depending on the chemical being analyzed. since there is no membrane and the entire sample is analyzed there is a resultant high sensitivity, even when using high-ratio dilution sampling systems.

1.7 Product Specifications

1.7.1 19'' Rack-Mount System

Ionization Source	Tritium (3H), activity level 8.1 mCi (300 MBq), usefull life >10 years
Dimensions	483mm x 89mm x 358mm (L x H x W)
Weight	Rack- 6.44 kg (14.2 lbs.)
Power	110-240VAC 50/60 Hz
Power consumption	~15W
Data Output	Current loop 4-20 mA (analog), USB (inside housing); Optional: RS232/485, WLAN, Ethernet, USB, relay (max. 24 V/ 6 A)
Sample input and output connectors	1/4" Swagelok
Trigger in and out connectors	Din sub D 25
Current loop connector	Din sub D 25
Operating Temperature	0 to +50°C (32 to +122°F).
Operating Humidity	0% to 90% (non-condensing).
Storage Temperature	-20 to +50°C (-4 to +122°F).
Intake Flow	250 ml/min at atmospheric pressure
Sample Exhaust	Atmospheric pressure +/- 0.5 psi (max)
Display	(1) 3.5" TFT display (2) Display of the IMS signal via PC
Warming up time	Approximately 20 minutes
Carrier gas	Application dependent
Li-Battery	Typically 8h operation time (at room temperature)
Enclosure	19" Rack standard indoor enclosure

1.7.2 Industrial Enclosure (NEMA 4X)

Ionization Source	Tritium (3H) , activity level 8.1 mCi (300 MBq), usefull life >10 years
Dimensions	400mm x 500mm x 157mm (L x H x W)
Weight	20 kg (44.1 lbs.)
Power	110-240VAC 50/60 Hz
Data Output	Current loop 4-20 mA (analog), USB (inside housing); Optional: RS232/485, WLAN, Ethernet, USB, relay (max. 24 V/ 6 A)
Sample input and output connectors	1/4" Swagelok

Other Connectors	3 x M25 cable brushings 1 x M20 cable brushing Connection terminals (X0 – High Voltage and X1-3)
Operating Temperature	-40 to +50°C (-40 to +122°F).
Operating Humidity	0% to 90% (without condensation).
Storage Temperature	-40 to +50°C (-40 to +122°F).
Intake Flow	250 ml/min at atmospheric pressure
Sample Exhaust	Atmospheric pressure +/- 0.5 psi (max)
Display	5.7" TFT display
Warming up time	Approximately 20 minutes
Carrier gas	Application dependent
Enclosure	NEMA 4X (IP 66) Outdoor enclosure

2. Installation and Operation

2.1 Installing the Unit

Due to the different installation requirements of each site and application these installation note are to be considered guidelines with the understanding that the minimum install requirement are that the analyzer is securely mounted at the point of application and protected from damage.

The Rack form of the unit is to be installed into a standard 19" rack mount and secured with the to the rack frame by bolting to the rack frame or some other secure method. Once the unit is fixed in place the sample inlet and outlet lines as well as power and data connections are made following the information provided in this manual and any specific customization instructions relating to the particular application and installation location.

The NEMA 4X case is provided with through case mounting openings to allow the case to be bolted to an secure location at the point of application by direct bolting or through the use of mounting adapters or brackets to provide for secure installation. (See the provided drawings of the NEMA 4X case for reference.) Once the unit is fixed in place the sample inlet and outlet lines as well as power and data connections are made following the information provided in this manual and any specific customization instructions relating to the particular application and installation location.

2.2 Control Elements

2.1.1 19'' Rack-Mount System

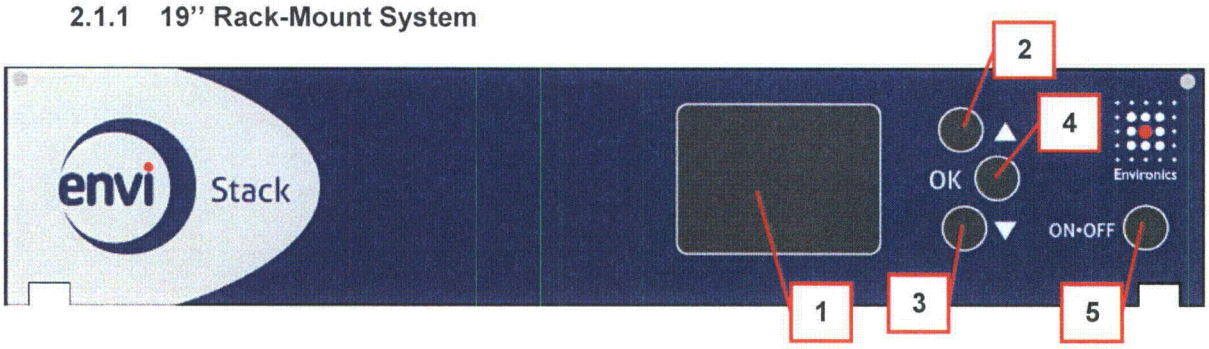


Figure 1: Control elements, 19" Rack-Mount System

1. Display
2. "▲" Button
3. "▼" Button
4. OK Button (highlighted item selection.)
5. ON/OFF Button

2.1.2 Industrial Enclosure (NEMA 4X)

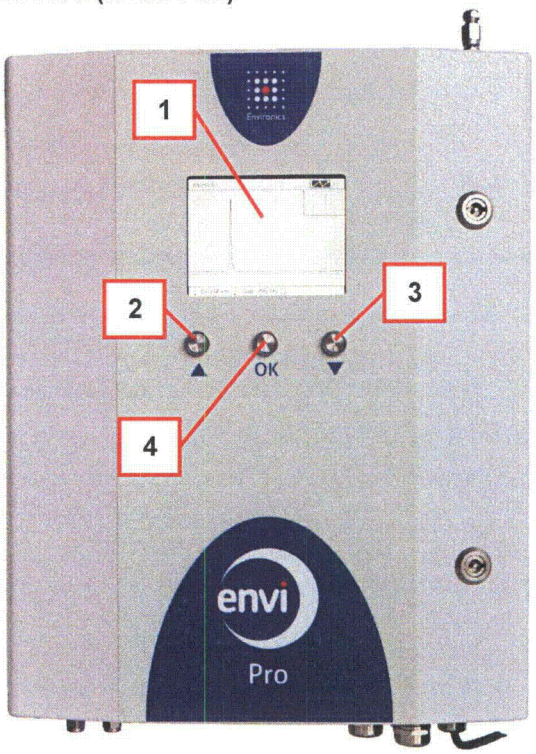


Figure 2: Control elements, NEMA 4X System

1. Display
2. "▲" Button
3. "▼" Button
6. 4. OK Button (highlighted item selection.)

2.2 Starting up the Device

NOTE: ***The following figures are for general illustration since each unit is customized to the needs and specifications of the particular customers application there maybe differences in the specific install and setup. This does not affect the overall validity of the here described functions, displays and outputs of the device***

Step 1

Please connect the device with your power supply by using the battery power cord in the case of the 19" rack. Connect the 4X enclosure to line power as directed. Connect the analyzer to the data system according to the cable pin outs or connector assignments as seen in table 6 and 7 for your respective form of the analyzer.

Step 2

19" Rack-Mount System:

Press the "On/Off" button for about 3 sec. The display will show the ENVI logo (Fig. 6) while the system startup and self test phase is initiated. During this the display will show a blue bar where is stated that the SDcard is initialized (Fig.7). This will take a few seconds. After the hardware check the device will show the "Self-Test Screen" (refers to chapter x.y; Fig. z). In that case skip step 3.

After long transports the internal memory may “forget” the date and time settings. In that case the display will switch to the "Date & Time" menu (see Step 3).

Industrial Enclosure (NEMA 4X)

The Industrial Enclosure (NEMA 4X) possesses no "On/Off" button and will start to operate as soon it is connected with your power supply.

The display will show the ENVI logo (Fig. 6) while the system startup and self test phase is initiated. During this the display will show a blue bar where is stated that the SDcard is initialized (Fig. 7). This will take a few seconds. After the hardware check the device will show the "Self-Test Screen" (Fig. 7) In that case skip step 3.

After long transports the internal memory may “forget” the date and time settings. In that case the display will switch to the "Date & Time" menu (see Step 3).

Fig. 6: ENVI logo screen

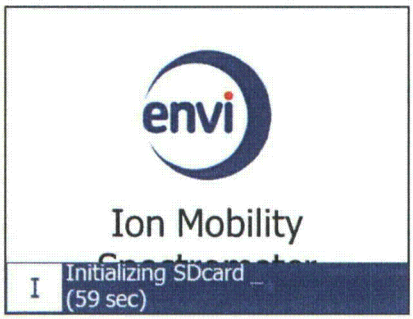


Fig. 7: SDcard initialization screen

Step 3

The display shows the "Date & Time" menu (Fig. 8). If the time and date settings are correct, please, confirm each item with "OK".

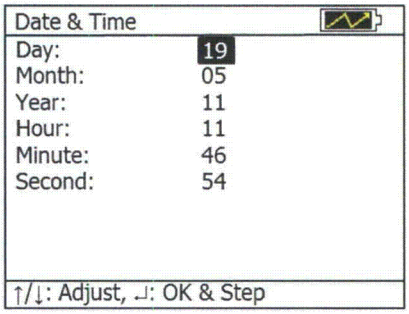


Fig. 8 Date & Time screen

When the time or the date needs to be entered, use the "▲" and "▼" buttons to adjust the highlight bar to the desired value and confirm with "OK". Pressing "OK" will take you to the following item.

When all time and date settings have been confirmed press "OK" to proceed to the "Self-Test Screen" (refers to Step 4; Fig. 9).

Step 4

The "Self-Test Screen" (Fig. 9) shows the condition and values of the various sensors implemented in the device. The sensor data indicates if the device in operating condition or not. It thus prevents invalid measurements.

Self-Test

Sensor	Target	Actual	State
T1 (C)	60 +/- 1	59.5	
T2 (C)	0	0	
T3 (C)	0	0	
T4 (C)	0	0	

Elapsed time: 0d 00h 00' 02"
(Remaining time: 17 sec)

Fig. 9: Self-Test screen

The "Self-Test Screen" shows the target value as well as the active readout value of the sensor and a sensor condition light. The condition lights serve as a fast overview. A green condition light next to the sensor indicates that the component has reached its proper operating condition. A red condition light indicates the component has not yet reached its proper operating condition. If one or more sensors show a red condition light, the device holds in the Self-test screen while it is waiting for the system to stabilize and come ready. As soon as the target value is reached the condition light will switch to green. If a sensor shows target and actual values of 0, this sensor is not needed for this application and hence disconnected. In this case the condition light of this sensor will automatically switch to green.

When all sensors show green lights the device holds for about 20 seconds to confirm and subsequently proceeds to the "IMS Main Menu".

⚠ **NOTE**: ***In a case of a cold start it usually takes approximately 20 minutes until the device reaches its working temperature. Depending on the devices core temperature and the ambient humidity during storage and/or transport please schedule that the IMS detectors warm up phase may take up to 2 hours. This may be necessary to allow the scrubber system of the IMS gas flow to remove all traces of condensed moisture.***

2.3 Mode Selection

As soon as the device has attained its operating condition "IMS Main Menu" will appear (Fig. 10).

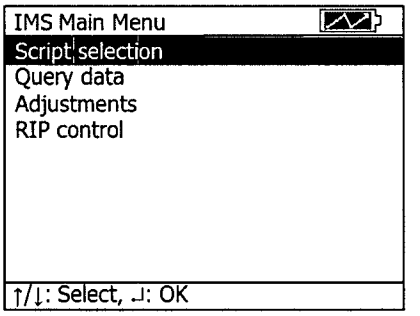


Fig. 10: IMS Main Menu

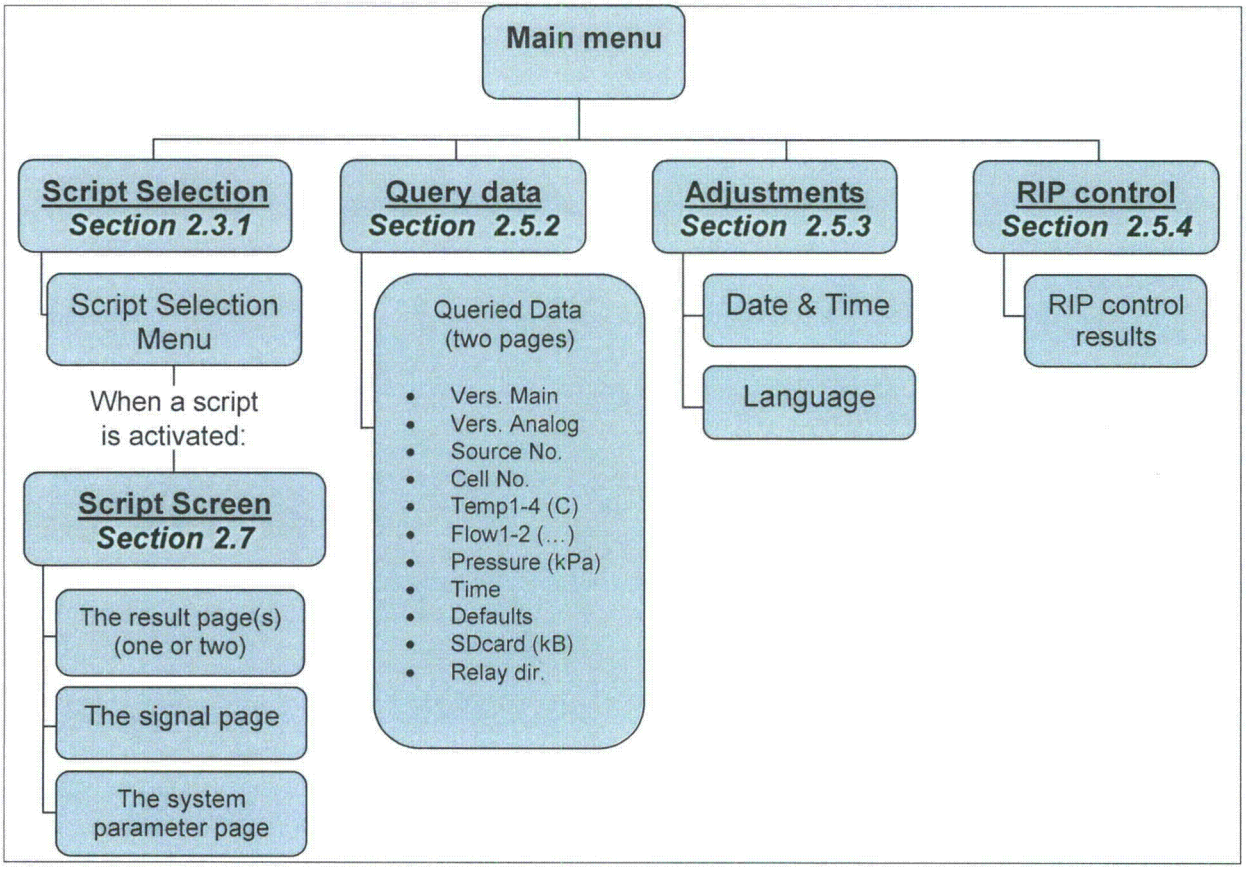
In the "IMS Main Menu" you may choose one of the following items:

Script Selection:
Start one of the implemented scripts.
Query Data:
Display of the current system parameters.
Adjustments:
Change date and time settings or the display's language.
RIP control:
Checks position and height of the Reactant Ion peak (RIP).

To choose one of the items use the "▲" and "▼" buttons until the wanted item is highlighted. To access the highlighted option press "OK".

The menu hierarchy is presented in figure 11 below.

Figure 11 - Menu hierarchy



2.3.1 Script selection

When accessing the "Script Selection" item the display switches to the "IMS Script Selection Menu" (Fig. 12) and will show the names of all the scripts that are currently loaded into the analyzer. Choose one of the scripts by using the "▲" and "▼" buttons until the desired script is highlighted. To select or activate the desired script press "OK". The script is immediately activated and the display shows the "Script Screen".

If you do not want to choose a script, select "Back to Main Menu" to return to the prior screen.

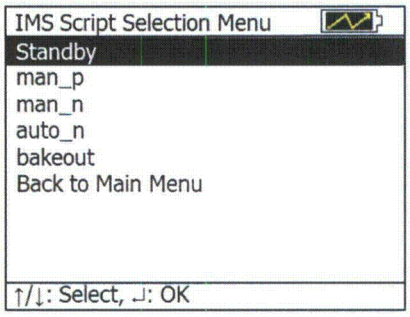


Fig. 12: IMS Script Selection Menu

2.3.2 Query data

Accessing the "Query Data" item the display shows the "Queried Data" screen 1 (Fig. 13). A second "Queried Data" (Fig. 14) screen is available by using the "▲" and "▼" buttons.
This first screen displays most of the important system parameters in the following succession:

1. Ver. Main: Version number of the main board software
2. Ver. Analog: Version number of the analogue board software
3. Source No: Serial number of the ionization source
4. Cell No: Serial number of the detector
5. Temp1-4 (C): Temp1 , Temp2, Temp3, Temp4
   Detector, n.c. , n.c. , n.c.
6. Flow1-2 (...): Not connected (show zero)
7. Pres (kPa): Active read out of the implemented pressure sensor
8. Time: Date and Time (DD.MM.YY HH.MM.SS)
9. Defaults: Displays the parameters default settings
   Temp1, Temp2, Temp3, Temp4, Pump1, Pump2, Pump3
   Detector, n.c. , n.c. , n.c. , sample , n.c. , circuit
   n.c. = not connected (shows zero)
10. SDcard (kB): Monitors the memory on the SDcard in kilo Byte
    (memory in use / total memory available)

In this view the parameters cannot be changed. By pressing "▲" or "▼" you can access the second "Queried Data" screen. This screen displays the allocation of the relay boards in the following manner:

11. Relay dir.: Slot no.0: Type, Slot no.1: Type, Slot no.2: Type, Slot no.3: Type
    0: na, 1: na, 2: na, 3: na

There are two types of relay boards and two possible conditions resulting into three possible displays:

The conditions:
1. Relay board NOT installed => leads to the display of na
2. Relay board installed => leads to the display of the relay board type

The Type:
1. Type IN
2. Type OUT

Press "OK" to return to the "IMS Main Menu".

Queried Data	
Vers. Main:	05.04.00 (en)
Vers. Analog:	1.3.0
Cell No.:	IM6701.10032
Temp 1-4 (C):	59.5,0.0,0.0,0.0
Flow 1-2 (_):	0, 0
Pres (kPa):	102.3
Time:	19.05.11 11:46:25
Defaults:	60,0,0,0,1,0,1
SDcard (KB)	348 / 981996
↵: Quit, ↑: Next, ↓: Prev	

Fig. 13: Queried Data screen 1

Queried Data	
Relay dir.:	0:na,1:na,2:na,3:na
↵: Quit, ↑: Next, ↓: Prev	

Fig. 14: Queried Data screen 2

2.3.3 Adjustments

In the "Adjustments" menu (Fig. 15) you may choose one of the following modes:

- Date & Time:
  Change the displays time and/or date settings.
- Language:
  Change the displays language.
- Back to Main Menu:

Adjustments
Date & Time
Language
Back to Main Menu
↑/↓: Select, ↵: OK

Fig. 15: Adjustments menu

To select one of the items use the "▲" and "▼" buttons until the desired item is highlighted. Subsequently press "OK" to access the selected option.

- Date & Time (Fig. 16):
  Use the "▲" and "▼" buttons to adjust the highlighted item to the desired value and confirm with "OK". Pressing "OK" will also take you to the following item.
  When all time and date settings have been adjusted, press "OK" to return to the "Adjustments" menu.

- Language (Fig. 17):
  Use the "▲" and "▼" buttons to set the displays language either to "English", "German", "Chinese" (not shown in this example) or "Japanese" (not shown in this example). Pressing "OK" activates the highlighted item and returns to the "Adjustments" menu. Other language options may be available, contact your service provider for particulars.

Date & Time	
Day:	19
Month:	05
Year:	11
Hour:	11
Minute:	46
Second:	54
↑/↓: Adjust, ↵: OK & Step	

Fig. 16: Date & Time menu

Language
English
Deutsch
↑/↓: Select, ↵: OK

Fig. 17: Language menu

2.3.4 RIP control

This feature allows you to check the position and the height of the reactant ion peak. Choosing the RIP control topic automatically starts a check script which takes approximately one minute (Fig. 18). This feature compares if the active positive positions and negative RIPs lie within an interval defined in the software. The compared values include the deducted standardized value of the X-axis position in milliseconds as well as the heights. Additionally a result interpretation is given. The results of the completed check are displayed in the following form (compare Fig. 18 below):

Polarity; defined interval [msec]; current position [msec]; result interpretation

and

Polarity; defined height value [%]; current height value [%]; result interpretation

RIP Control Results

Pol.	Def.Pos.(ms)	Cur.Pos.(ms)	Results
(+)	[5.75,7.02]	6.71	OK
(-)	[5.51,6.73]	6.13	OK
Pol.	**Def.Val.(%)**	**Cur.Val.(%)**	**Results**
(+)	30	87	OK
(-)	30	96	OK

↵: Quit

Fig. 18: RIP Control results screen

Quit returns you back to the "IMS Main Menu"

2.4 Starting a Measurement

Since there are ***two types of scripts*** (automatic and key) the procedure of measurement starting depends on the active script, which in turn depend on the customer's specifications and thus varies between instruments and installations. To start an analysis you first have to select and

activate the desired script, (or macro) from the list of installed scripts on the analyzer. Refer to the relevant version of the GSMControl manual for a detailed discussion of the type and use of scripts.

If it is a so called automatic script no special start procedure is required. Automatic scripts automatically start a new measurement after a given time interval which is defined in the script.
If the selected script is a "key" script a measurement is started by pressing the "▲" button on the front panel or through a input signal to a specified relay from an external source. The time of a single measurement run varies due to the application and is defined in the script.

NOTE: ***It is not possible to start a new measurement while another measurement is in progress.***

2.5 The script screen

When a script is activated the display shows the "Script Screen". This screen actually consists of three or four screen pages.

- The result page(s) (up to two)
- The Detector signal page
- The system parameter page

All these pages have in common that they show the name of the active script as well as the active polarity of the high voltage (HV) (as a plus or minus sign) on their top. They will all react to the front panel button input in the following manner: Pressing "OK" quits the script even when a measurement is in progress and returns to the "IMS Main Menu" while the "▲" button starts a measurement and the "▼" button displays the next page.

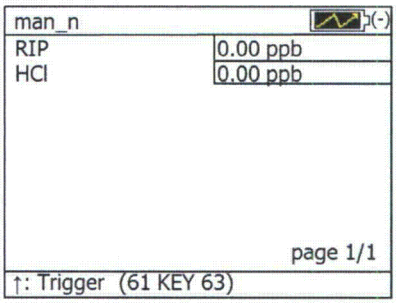


Fig. 19: Result page screen

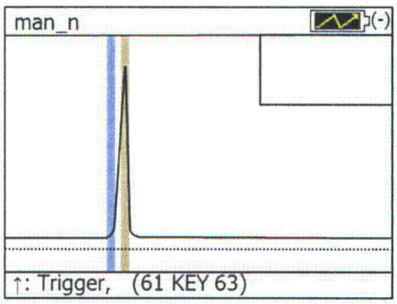


Fig. 20: Detector signal page screen

The ***result page*** (appears as soon as a script is activated) displays the RIP as well as the names of the substances defined in the running script and the measured concentrations (Fig. 19). In the lower right corner is displayed how many result pages are available and which of them is currently displayed. Hence the display always shows page 1/1 meaning that one page is available and this one is displayed.
The ***Detector signal page*** (Fig. 20) shows the active IMS signal beneath the script name. The display shows the active IMS spectrum. Vertical colored bars indicate the windows where the substances defined in the script will appear. The box in the upper right corner displays up to four highest of all found peaks, no matter if they correspond to a defined substance or not. Hence the display of these peaks may change as new spectra are incoming.
The ***system parameter page*** (Fig. 21) shows the active system parameters in the following succession:

1. HV: Active polarity of the high voltage (as plus or minus sign)
2. Temp1-4 (C): Active temperature (Temp1 , Temp2, Temp3, Temp4)

Detector, n.c. , n.c. , n.c.

3. Flow1-2 (...): Not connected (show zero)
4. Pres (kPa): Active read out of the implemented pressure sensor
5. Time: Date and Time (DD.MM.YY HH.MM.SS)
6. Defaults: Displays the parameters default settings
   Temp1, Temp2, Temp3, Temp4, Pump1, Pump2, Pump3
   Detector, n.c. , n.c. , n.c. , sample, n.c. , circuit
   n.c. = not connected (shows zero)
7. SDcard (kB): Monitors the memory on the SDcard in kilo Byte
   (used memory / total memory available)

(In this view the parameters cannot be changed!)

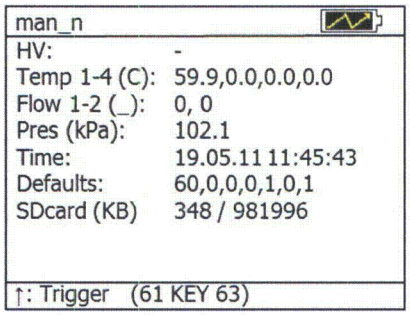


Fig. 21: System parameter page

2.6 Display of results

The page of the ***script screen*** shows the name of the substances defined in the running script as well as their concentrations. The concentrations are updated as incoming spectra becomes available. The update frequency corresponds to the rate of incoming data which is approximately every second but will be influenced by the settings in the selected script.

The results are displayed in the following form (view Fig. 19 above):

Name of the Substance	**Concentration**	**(and Percentage value)**
(Abbreviated – max. 15 characters)	(In ppm or ppb)	(Based on alarm thresholds, see customer's specifications)

Name of the Substance: The name of the substance designates the measured substance. Due to the confined display the displayed name is limited to 15 characters on this screen.

Concentration: This gives the concentration which has been measured for the substance as defined in the calibration values input for the device. The default unit is ppm or ppb but may be changed based on calibration.

Percentage value: The bar indicates the measured concentration in proportion to the adjusted display- and alarm thresholds. An open bar indicates that the concentration of the substance is so low that it is below the low alarm limits but above the zero value of the calibration. A completely filled bar (in red) indicates that this substance exceeds its alarm threshold. A partially backfilled bar in yellow indicates that the concentration exceeds the lower alarm threshold but not the higher alarm threshold. A partially filled bar in grey

indicates that the substances concentration exceeds the display threshold but not the lower alarm threshold. In the case of bars filled in yellow or grey a percentage value is displayed. This means that a measured concentration of e.g. 90 % of the concentration, which triggers an alarm, will lead to a bar which is filled to 90 % in grey. Hence the danger is easily estimated visually.

The numeric display of the concentration is written in an open bar. As long as the measured concentration does not exceed one of the alarm thresholds, this bar will be backfilled in grey and display a percentage value according to the current result. If the measured concentration exceeds the lower alarm threshold the bar will be backfilled in yellow and display a percentage value according to the current result. If the measured concentration exceeds the alarm threshold the bar entire display will be backfilled in red. In addition a flashing red sign will appear on the display and state ALARM as well as the name of the substance(s) exceeding the alarm threshold and its/their concentration (refers to chapter 2.9 for specifics).

2.7 Alarm

There are two states of alarm installed on the device:

Low alarm: This indicates that a substance occurs in an increased concentration but does not exceed a given limit for contaminants at the moment. In the case of the measured concentration exceeding the lower alarm threshold the bar will be filled in yellow in a percentage value reflecting the current result in relation to the set alarm limits, (Fig. 22). The measurement display (the grey or yellow bar) will persist until a new measurement is made by the analyzer. Hence the display of the yellow bar and the concentration may change or even vanish as new measurement values are calculated.

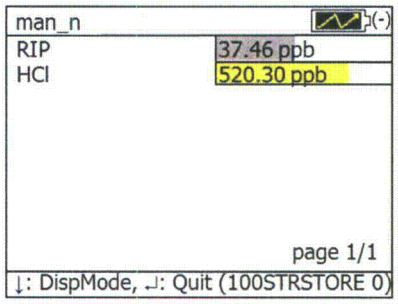


Fig. 22: Result page displaying a low alarm

High alarm: This indicates that a substance exceeds a the alarm limit for contaminant at that point in operation. In the case of the measured concentration exceeding the high-alarm threshold the concentration bar of this substance will be completely filled in red (Fig. 23). In addition a flashing red sign will appear on the display and state ALARM as well as the name of the substance(s) exceeding the alarm threshold and its/their concentration (Fig. 24). This red bar and the flashing red sign will persist until a new measurement is made. Hence the display of the red bar and the concentration may change or even vanish as new measurement values are calculated.

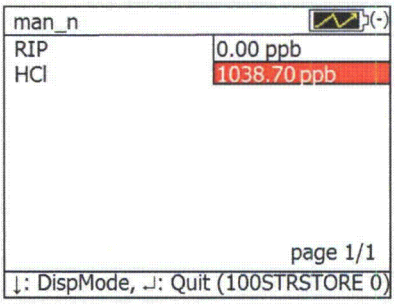


Fig. 23:
Result page showing a high alarm

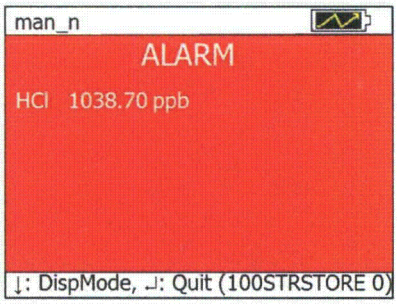


Fig. 24: Alarm Sign (will flash)

NOTE: ***The alarm signs will be disabled if you leave the "Script Screen"***

2.8 Activating a new measurement or standby mode

Pressing "▲" starts a new measurement (not necessary in the automatic mode).
Pressing "OK" leads you back to the "IMS Main menu" (Fig. 10). Once in the "IMS Main menu" choose "Script Selection" and start the script "Standby". The device is now in standby (HV and the sample pump are turned off) while the internal gas circuit still operates and cleans the detector.

2.9 Calibration

All ENVI™ analyzers offer the user the option to span calibrate the device. Span calibration is a common method for the updating of the analyzer calibration once installed on site or if there is a requirement for periodic calibration. For the span calibration of the device the user must check or know that the slope of the calibration curve is linear in the calibrated concentration range defined by the calibration concentrations presented to the analyzer. This range of linearity varies for each compound and is preliminary ascertained for each application during factory calibration and tests. Provided with each analyzer is a 'calibration' sheet that indicates the original factory calibration and approx linear range of the device for use as a reference. If there are any questions please contact the manufacturer for further instructions.

Before the calibration is done please provide the gas inlet with "zero gas". "Zero gas" consists solely of the matrix being analyzed WITHOUT the compound being monitored for being present. If for example you want to measure HCN in ambient air the "zero gas" of choice would be either ambient air without HCN in it or pure synthetic air.
To begin the calibration procedure, from the analyzer main page go to the script selection menu and activate the "Script Selection" mode. (refer to section 2.3 of this manual.) Subsequently choose the script "zero_mon". After the script "zero_mon" has been activated trigger at least one sampling of the "zero gas". You may also trigger more than one sampling.

Attention:
Do NOT trigger a measurement with the activated "zero_mon" while applying gases with any other compounds concentration but zero. This will compromise the calibration and may have disastrous impacts on the devices reliability concerning its accuracy and results. If you have triggered a measurement with the activated "zero_mon" while applying gases with any other compounds concentration but zero, you MUST repeat the calibration procedure.

When the "zero_mon" procedure has been done please apply the "calibration gas". "Calibration gas" consists of the matrix and a defined concentration of the compound of concern that is being measured. If for example you want to measure HCN in ambient air the "calibration gas" of choice would be either ambient air or pure synthetic air containing a defined concentration of HCN. Once this is done and an analysis cycle is complete press "OK" which will return you to the "IMS Main menu" (Fig. 10). Once in the "IMS Main menu" choose "Script Selection" again and start the script "span_calib" (refers to chapter 2.3.) After the script "span_calib" has been activated trigger at minimum one sampling of the "calibration gas". You may also trigger more than one sampling of this concentration which will be averaged.

Attention: Do **NOT** apply any other concentration than communicated and predefined (see customer's specifications or the original analyzer factory calibration sheet). This could corrupt the calibration and may have disastrous impacts on the analyzers reliability and accuracy of results. If you have triggered a measurement with the activated "span_calib" while applying gases with any other compounds concentration but zero you MUST repeat the entire calibration procedure.

No other action is required concerning the calibration. Press "OK" which leads you back to the "IMS Main menu" (Fig. 10). Once in the "IMS Main menu" choose "Script Selection" again and start the measuring script.

2.10 Turning the device off

In normal operation, trace or process analyzers should not be turned off. Generally the Envi Analyzer would be shut down for maintenance periods or during times of long plant shutdown only.

2.10.1 19'' Rack-Mount Systems

To turn off the rack analyzer return the unit to the "IMS main menu" display, then select the "Standby option", (refer to section 2.3.1 above.) After activating the "Standby" function, press the "On/Off" button (Fig.1) for about 3 seconds. The analyzer will then shut down automatically.

NOTE; ***The rack form of the ENVI analyzer has a internal battery. Due to this the unit may still be operational or powered in the case of a shutdown based on the removal of power to the back of the unit.***

2.10.2 Industrial Enclosure (NEMA 4X) Systems

To turn off the NEMA 4X from of the analyzer return the unit to the "IMS main menu" display, then select the "Standby option", (refer to section 2.3.1 above.) After activating the "Standby" function, turn off the supplied power to the unit. Once this is done the unit is shut down.

⚠ **Note**: ***When turning the device on after a long period of inaction please keep in mind that it may take up to 60 minutes or longer for the scrubber(s) to removed all traces of possible condensed moisture from the system.***

2.11 Battery level indicator (19'' Rack-Mount Systems only)

To provide the operator with the method to check the internal battery status of the rack unit it is equipped with an internal battery status display. A battery level indicator which resembles a stylized battery is always shown in the upper right corner of the display and depicts the active battery state. The only exception is the ENVI logo screen (refer to section 2.2, and Fig. 6) where the battery level indicator is not shown at all.

The device automatically recognizes if it is connected to a power supply or running on battery and matches the battery use indicator to its current powered status . As long as the device is provided with electricity via external power the stylized battery is filled with a black rectangle which is tagged with a yellow lightning (Fig. A). This is not an indicator of the battery level, this display is just indicating that the unit is being provided power from the external source. When the analyzer is provided power from the external source it will automatically charge the internal battery as needed or trickle charge the internal battery to maintain the battery capacity.

If the device is running on battery for more than 10 seconds the battery level indicators display changes. It will now show three squares. These squares can either be filled or open and may be colored green, yellow or red. If the battery is fully charged these squares are colored green and all of them are filled (Fig. B). At that stage the battery will typically ensure an operation period of up to 8 h. As the battery charge drops the squares depiction is changed subsequently one by one from filled to open and their colors will change. As long as three of the squares are filled the battery is considered "fully" charged and the squares are colored green (Fig. B). When only two squares are filled the battery is considered "half-loaded" and the squares color will turn yellow (Fig. C). This indication display show that the unit is still running on battery power and has somewhere less than 8 hours of operation left based on the internal batteries charge status. When there is only one filled square left the squares color turns red (Fig. D) indicating that the active battery level is fairly low. At that stage it ensures further operation for period of time approximately 1-2 hours depending on use and environmental conditions.

Once all squares are depicted open and red (Fig. E) the internal battery level has reached a very low level. . At this point the battery charge will operate the analyzer for only approximately **10 Minutes only**. Depending on the application immediate actions must be taken since the device will automatically shut down if it is not provided with electricity before the internal battery is completely depleted.

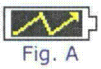


Fig. A

Fig. B

Fig. C

Fig. D

Fig. E

NOTE: ***A completely charged battery will usually have an operation period of up to 8 hours, depending on environmental conditions and analyzer operation.***

2.12 Charging the batteries (19" Rack-Mount Systems only)

All 19" Rack-Mount Systems will automatically go into a charge state for the internal battery once the analyzer is connected to an external power source. The internal charging software will note the charge status of the internal battery and either go to full charging status in the case of e depleted battery or one of low internal charge or automatically switch to trickle charge mode in the case of a fully charged internal battery.

NOTE: ***While the internal battery feature can allow for the rack form of the analyzer to be used as a field unit, it is not recommended. Since the device is not equipped for field applications we strongly advise NOT to use the device for other uses than as intended.***

3. TROUBLESHOOTING

Note: ***All battery related issues apply the 19" Rack-mount systems only.***

Table 6 Troubleshooting

PROBLEM	POSSIBLE REASON AND SOLUTION
The device cannot be switched-on.	The device is not properly connected to the external power supply. Check the contact between power supply and the device. The internal batteries are empty. Connect the device to the external power supply. Wait 5-10 minutes before switching-on the device again.
When switching the device on, the display lights up but after a few seconds the device switches itself off.	Internal Battery charge level is too low to operate the analyzer. Connect the analyzer to external power and allow the unit to charge the internal batteries for 15 minutes before switching the analyzer on again.
After switching-on the ENVI logo remains displayed and the "Self-Test" screen does not appear.	The internal computer did not recognize one of the other components of the device and crashed. Please switch the device off and then on again. If the problem persists contact your service provider for further help.
One of the sensors in the Self-Test Screen shows S.E. instead of the active value.	S.E. (sensor error) indicates that the active value for the indicated sensor is out of range. For example this could be the case if the devices core temperature is lower than -45°C or higher than 150°C due to storage conditions. Please allow the analyzer to stabilize at the desired environmental conditions before restart or operation. If the devices core temperature is definitely within the operational range, the indicated sensor may be broken. If this is the case or if the problem persists contact your service provider for further help.
A red bar appears at the displays bottom and in that bar are one or more numbers displayed.	An error occurred. Please check the error code table (refer to section 4 for more information.)
The device shows the IMS signal, but it does not appear on the PCs monitor.	The time and date settings on the device differ from those on the PC. Please check the devices time & date settings and adjust them (refers to section 3.7)

4. ERRORS AND WARNINGS

4.1 Error codes

If an internal error occurs a red bar will appear at the bottom of the display. In the red bar is a code number stated which identifies the error (Fig. 25).

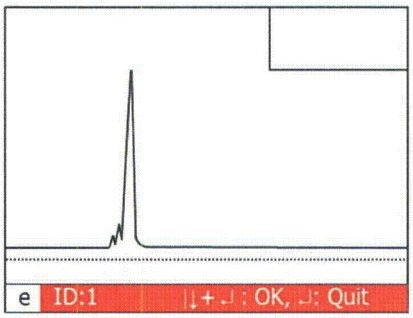


Fig. 25: Detector Signal Page showing an error bar

Listed below are the internal error code numbers and a description of the possible problem if applicable. in several of the cases you will be asked to run the internal diagnostic program and send the resultant information to the manufacturer. The instructions for the Diagnostic tool are listed in section 4.2 below.

<u>NOTE:</u> ***In some of the internal error codes/cases actions may refer to the GSMControl software and it's manual. Please be aware that the software and the corresponding manual may not have been provided to you. If this is the case please contact your service provider for further information.***

"E" ID 1 Position of RIP not detected
Please run RIP control (refers to section 3.5) and in the case that no improvement is apparent, please run diagnosis tool (see GSMControl software manual, if provided) and/or call your service provider for further help.

"E" ID 2 Internal error
Please run diagnosis tool (see GSMControl software manual or section 4.2 following) and/or call service provider.

"E" ID 3 One or more script-commands are unknown
Please check the script and transfer it again or a new one.

"E" ID 4 Service date is exceeded
Please arrange for maintenance to be done.

"E" ID 5 The memory of the SDcard is full
Please delete the SDcard memory or insert an empty one.

"E" ID 6 PC communication timeout
Please check the communication between the analyzer and the computer..

"E" ID 7 through 16 Indicate internal function errors;
Please run diagnosis tool (see GSMControl software manual or section 4.2 following) and/or call service provider.

"E" ID 17 SDcard file system error
Please format or change SDcard

4.2 Diagnostic Tool and instructions

If it is believed that there is a technical problem with the device you may run a diagnosis program. This diagnosis program will create a file which can be e-mailed to Environics-IUT and aid in the diagnostics of the detector. To arrange a diagnosis a script must be started in advance mode(refer to section 2.4 of this document.)

When a script has been activated the Diagnosis tool can be accessed. To run the diagnosis tool please click the topic Tools in the menu bar :

A drop down menu will appear displaying the items "Read/Clear stored Eeprom data ..., Read/Clear stored SDcard data ..., Transfer clock-timed script data ... and Diagnosis"

Select Diagnosis, which will set a checkmark and store all incoming data into a DIAG file. The DIAG file name has the form DIAG YY-MM-DD-HH-MM-SS.txt and is packed into a zip file of the form DIAG YY-MM-DD-HH-MM-SS.zip. While the diagnosis tool is checked all incoming data is saved into the diagnostic file. It is recommended to perform at least one measurement cycle before unchecking the diagnosis tool to ensure a good data basis. To uncheck the diagnosis tool click the topic Tools in the menu bar (Fig. 1, 6), subsequent click Diagnosis again.

The GSMControl program will show a dialogue which gives notice that the Diagnosis has been performed and in which location the zip file has been stored. The dialogue will also ask you if you wish to e-mail the file to Environics-IUT. If you click yes, your standard mail program will open its mail editor and setup a email. The recipient and subject will have already been inserted. You may add a comment and Environics-IUT recommends attaching the DIAG file to the mail.

4.3 Warning codes

When a warning code situation in the analyzer occurs a green bar will appear at the bottom of the display. In the green bar is a code number stated which identifies the warning (cp. section 4.1, Fig. 25.) *The difference between a device error code and a warning code is only that the bar will be green and the white square on the left side of the display shows a "w" instead of an "e").* Below the code numbers and their meanings are given with the information how to handle the warning.

"W"-ID 1 90% of the SD-cards memory is full
No immediate action necessary but you may delete the SDcard memory or insert an empty one, if you wish to save the data on the SD card. If no further action is taken the SD card memory will be overwritten, (starting with the oldest chronological date/time stamped files) automatically as the analyzer needs more storage space on the installed SD card.

5. WARRANTY

Environics-IUT / Oy warrants to the customer that products manufactured or sold by Environics are free from defects in materials and workmanship. Environics' standard warranty period is one (1) calendar year from the original delivery date.

5.1 Warranty instructions

In the case of a warranty issue the customer shall return failed analyzer using instructions detailed in paragraph RETURN POLICY, below to the specified location, transportation charges prepaid, and Environics-IUT agrees to either repair or replace at its sole discretion, any analyzer or other product which under proper and normal use prove defective in material and/or workmanship within twelve (12) months after shipment. Those items repaired or replaced by Environics under warranty shall be returned to customer transportation charges prepaid. Repaired or replaced items shall only be warranted for the remaining duration of the original item. Those items that are deemed by Environics Oy not to be defective or are determined to have failed due to misuse or abuse shall be returned to the customer at customer's expense, if the customer chooses not to pay for reasonable repairs. In respect to any claims by customer hereunder, Environics shall have no liability unless customer complies with instructions given by Environics.

5.2 Warranty exclusions

This warranty is contingent upon customer's proper use of the analyzer and/or other products in the application and operating environment for which they were intended by Environics-IUT. The warranty is not applicable to any products that have been modified or subjected to unusual physical, environmental, or electrical stress, or for which the original identification marks have been removed or altered. These warranty provisions do not apply to any damage resulting from combat, malicious damage, negligence, unauthorized maintenance or modification, accident, neglect, misuse, improper servicing, transportation, or normal wear and tear of the equipment. In addition, this warranty specifically excludes loss or damage to third parties and consequential damages of any kind.

Determination as to whether this warranty provision applies to damaged goods shall reside solely with Environics. Disposition of any damaged goods deemed outside of this provision shall be the responsibility of customer. The following consumable items are excluded from this warranty:

Scrubber(s) and scrubber seals and internal particulate filter(s)

5.3 Disclaimer of implied warranties

The express warranties contained in this agreement are the sole and exclusive warranties provided by Environics-IUT. Environics specifically disclaims any other warranties, express or implied including but not limited to warranties of merchantability or fitness for a particular purpose, as well as any warranties alleged to have arisen from custom, usage, or past dealings between the parties.

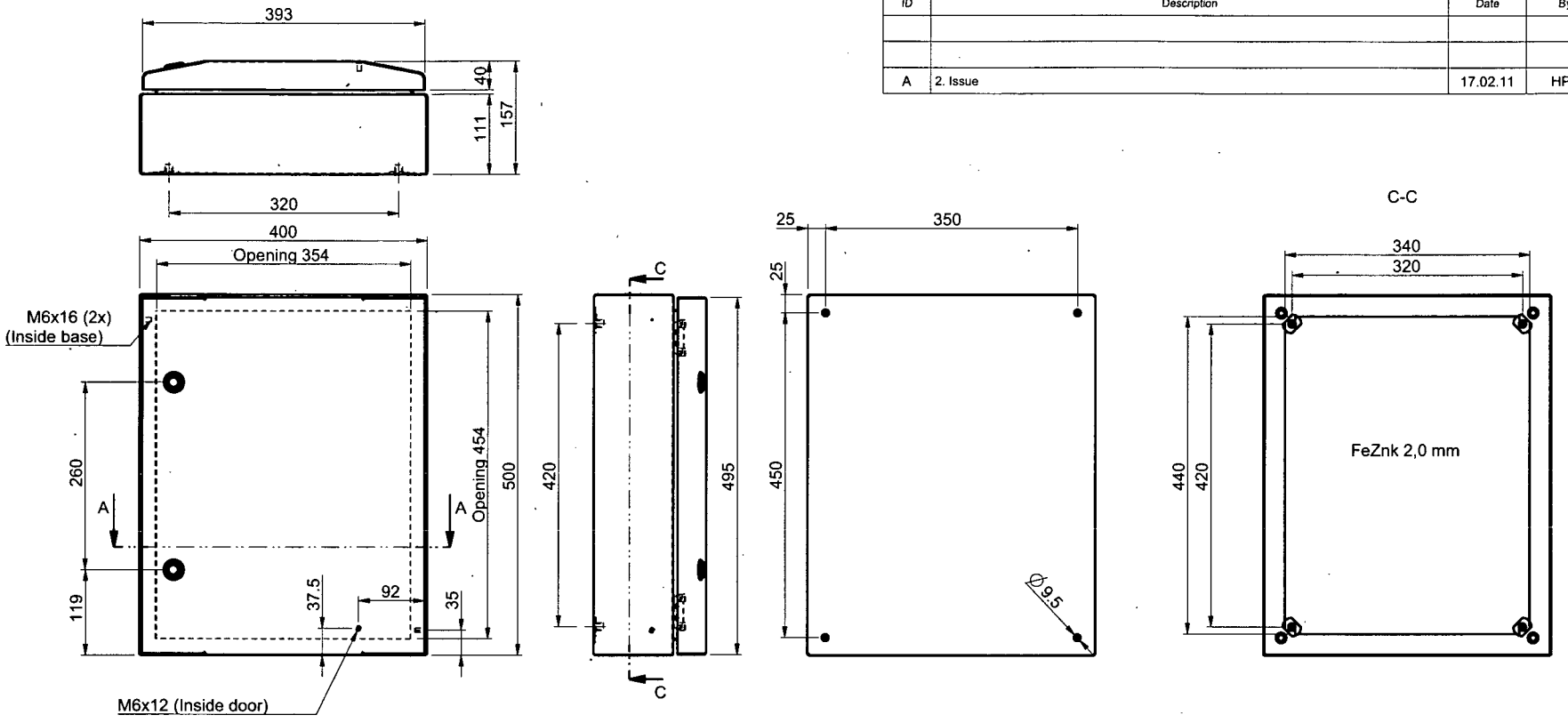
6. RETURN POLICY

Environics does not accept returns for refund, credit or exchange for any reason. If a product is being returned for warranty or maintenance work Environics Oy requires prior notification and approval before the shipment can be accepted. Problems with the analyzers may be reported by calling, faxing, or e-mailing, your local distributor or service personnel or Environics-IUT. See below for contact information:

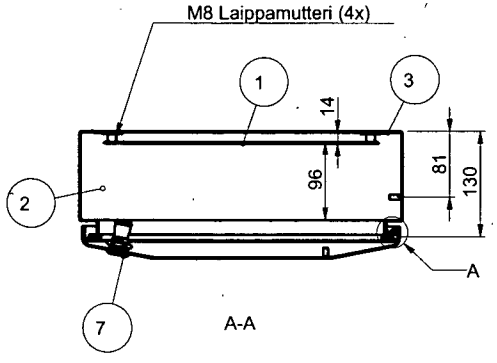
Environics Oy Graanintie 5 P.O. Box 349 FI-50101 Mikkeli FINLAND Tel. +358 201 430 430 Fax +358 201 430 440 E-mail: customer.services@environics.fi	Environics USA, Inc. 1308 Continental Drive, Suite J Abingdon, MD 21009 USA Tel: +1 410 612-1250 Fax: +1 410 612-1251 E-mail: sales@environicsusa.com www.environicsusa.com	Environics-I.U.T. GmbH Volmerstraße 7 B 12489 Berlin Germany Tel. +49 30 6392-5511 Fax. +49 30 6392-4831 E-mail: info@environics-iut.com

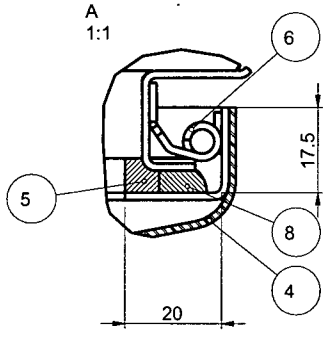
After reporting the problem, follow the instructions given by the manufacturer.

ID	Description	Date	By	Appr.
A	2. Issue	17.02.11	HPa	



HUOM!
MAALAUS RAL 7035E





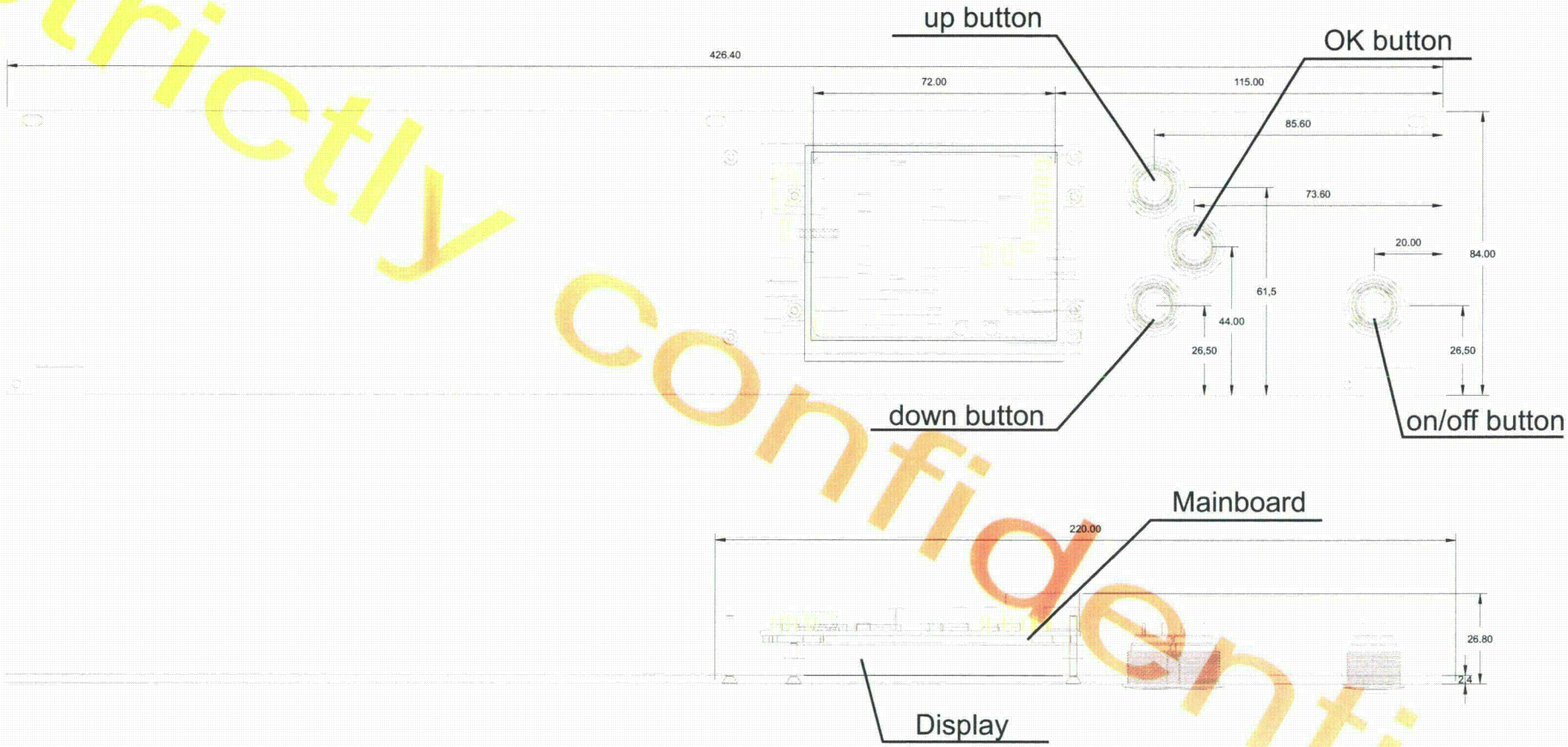
Part	Code	Drawing No.	Description	Information	Pcs
8	PUR		PUR tiiviste		1
7	VPTL107		Lock / Lukko	+ VPTL107.1	2
6	VPTJ51	-	Hinge base E RST screw-fix		2
5	VRDM21		EMC 7x7 tiiviste		1
4	RST 8808	-	DOOR / OVI		1
3	PUA7		DIN125 M8 ZnC aluslevy		4
2	RST 8810	-	BASE / POHJA		1
1	PPE1xxxx	-	ASENNUSLEVY		1

Material:		Ensto Mat: RST	
Supplier: -	Tool No:	Weight [g]: - g	Volume: -
ENSTO CONTROL OY		ENCLOSURE ESSP 405016 -	Replaces:
Scale 1:6	Date 15.02.11		Replaced:
	By HPa		Drw No:
	Checked		Ref:
	Ctrl		Code: KOT61999
			Sheet No: 1 (1)

model KOT61999.PART
drawing KOT61999.DRAWING

Tolerance ISO 2768-m						
>0,5 =3	>3 =6	>6 =30	>30 =120	>120 =400	>400 =1000	
±0,1	±0,1	±0,2	±0,3	±0,5	±0,8	

Strictly confidential



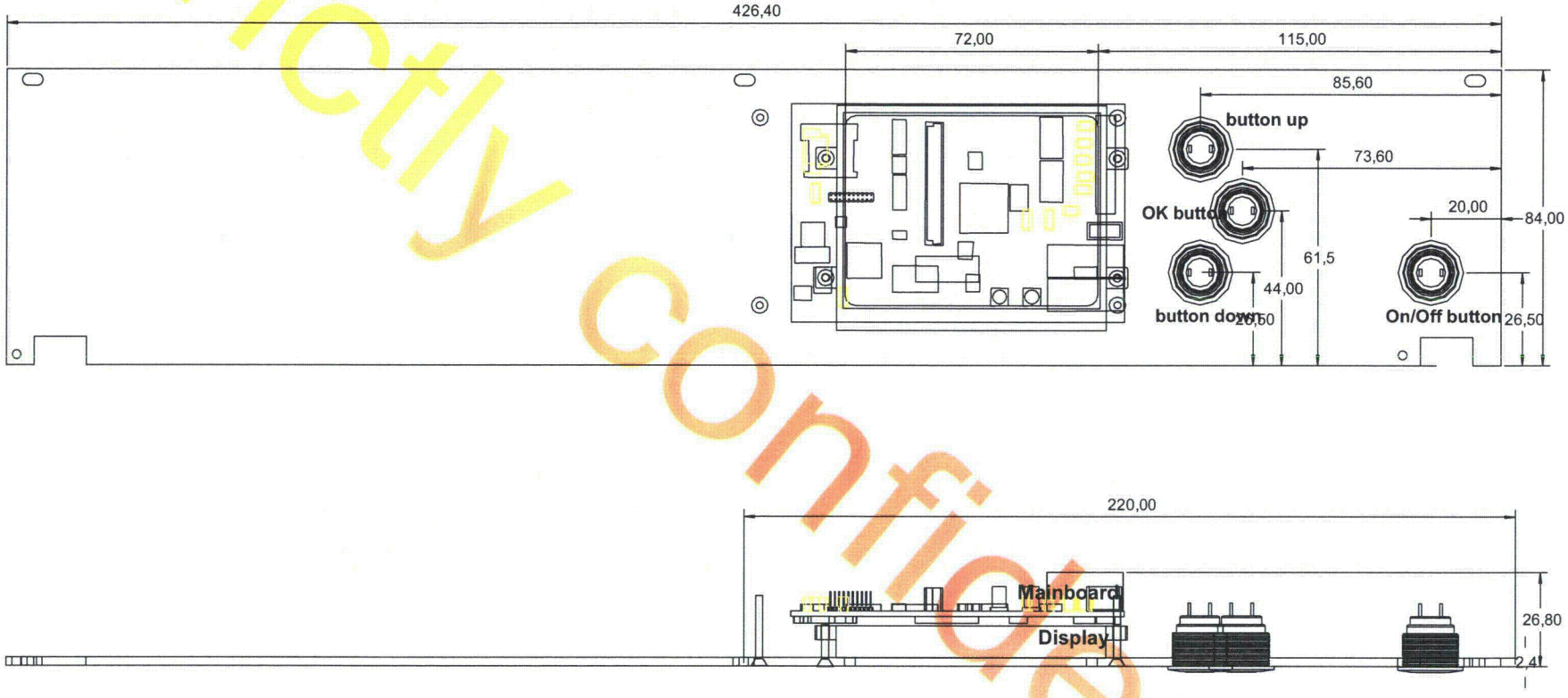
Maße ohne Toleranzangabe nach DIN 7168 mittel	Stückzahl 1	Maßstab 1 : 1	Halbzeug
		Werkstoff Aluminium	
2010 Bearb.	Datum 20.01.2011	Name B.Räbiger	Benennung Frontplatte IMS 200i / GC-IMS 200i
Gepr.			
Norm			
Freig.			
Environics-IUT GmbH			Zeichng.-Nr. IM17.11.0405

Zust. Änderung Datum Name

Blatt

Bl.

100-240VAC
50/60Hz
RS 232
current loop
4-20mA
trigger voltage in
trigger voltage out
gas inlet
span
gas outlet
zero



strictly confidential

				Maße ohne Toleranzangabe nach DIN 7168 mittel		Stückzahl 1	Maßstab 1 : 1
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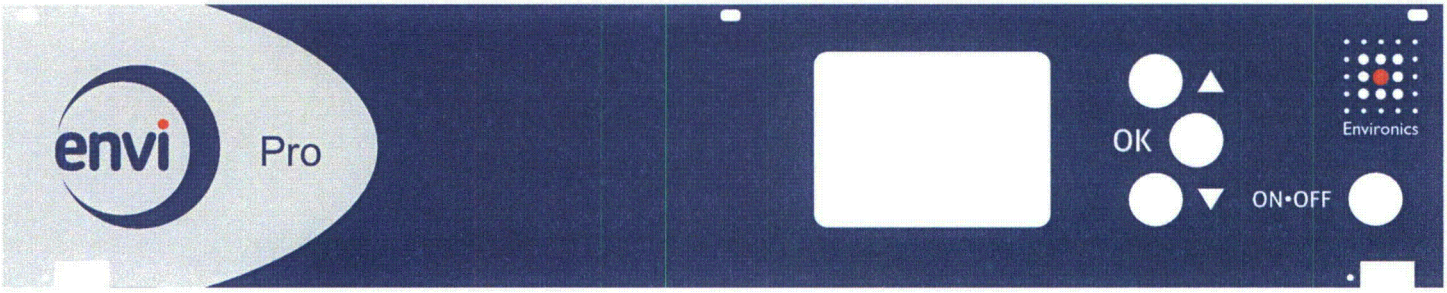
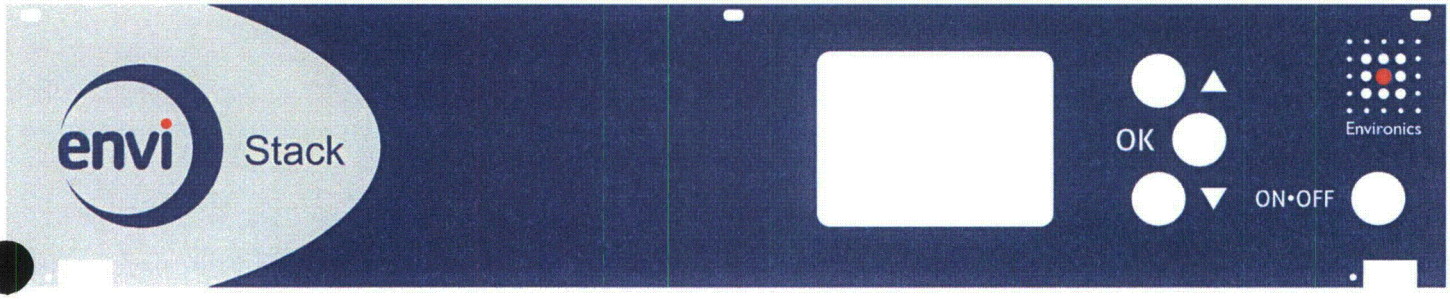
				2010	Datum	Name	Benennung
				Bearb.	20.01.2011	B.Räbiger	Frontplatte IMS 200i / GC-IMS 200
				Gepr.			
				Norm			
				Freig.			
				Environics-IUT GmbH			Zeichng.-Nr. IM17.11.0405
Zust.	Änderung	Datum	Name				Blatt / Bl.


envi
Pro
OK
ON•OFF
Environics


envi
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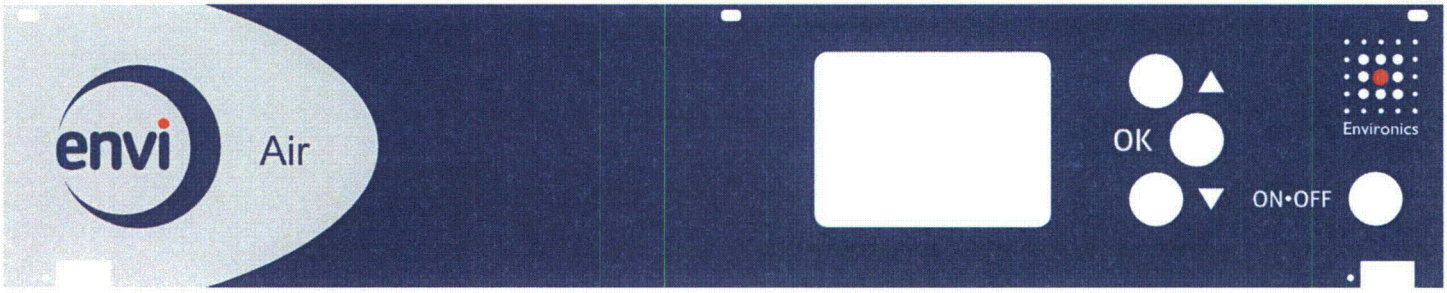
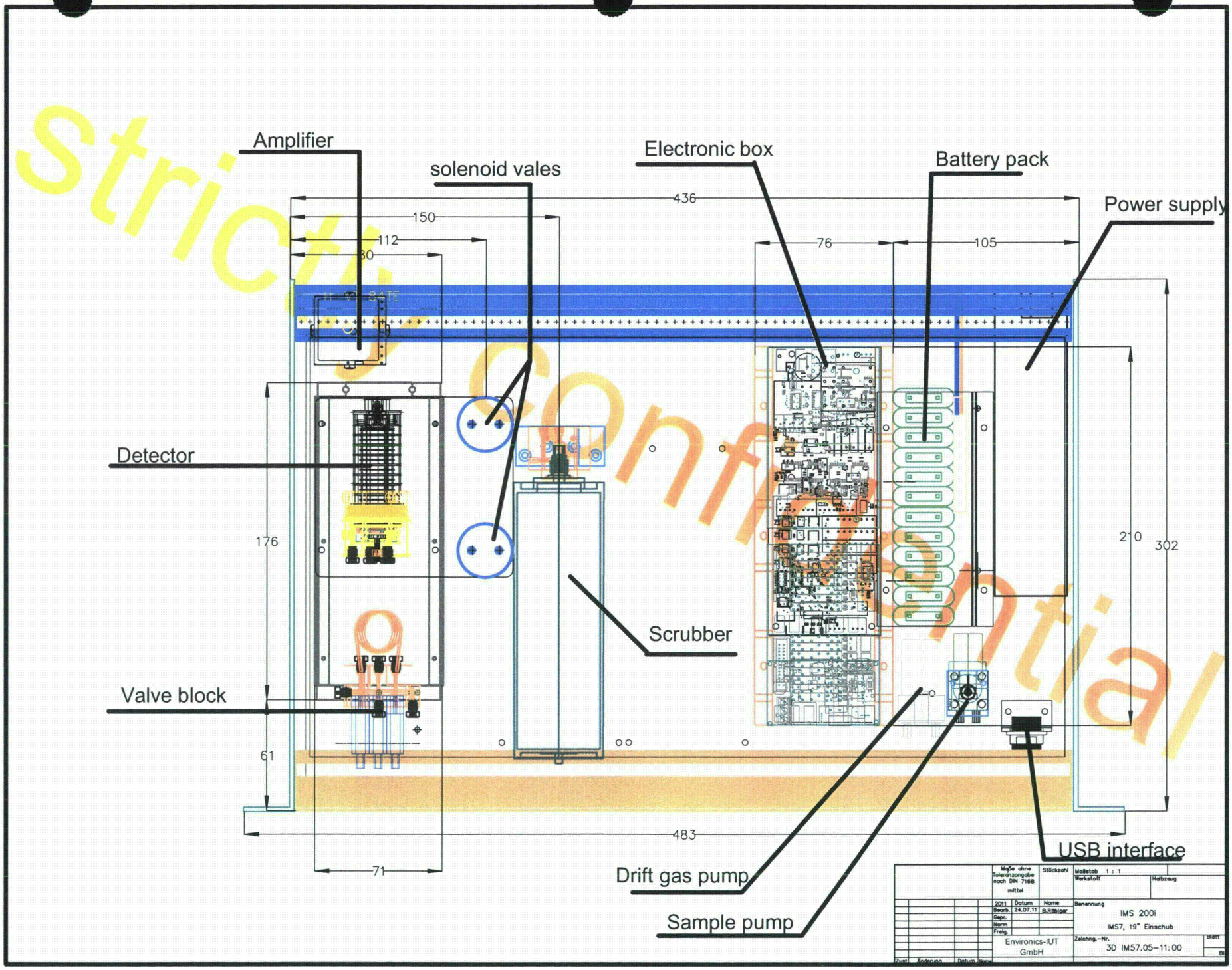
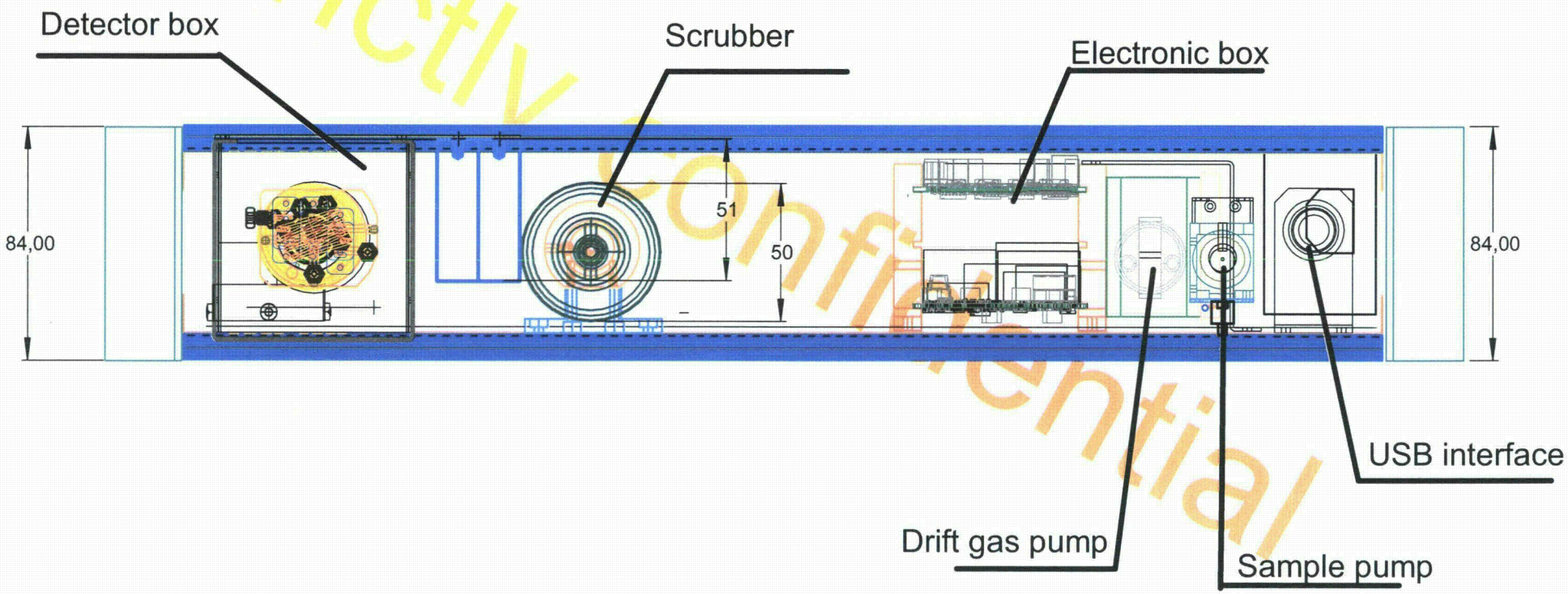
OK
ON•OFF
Environics


envi
Air
OK
ON•OFF
Environics

envi
AirS
OK
ON•OFF
Environics



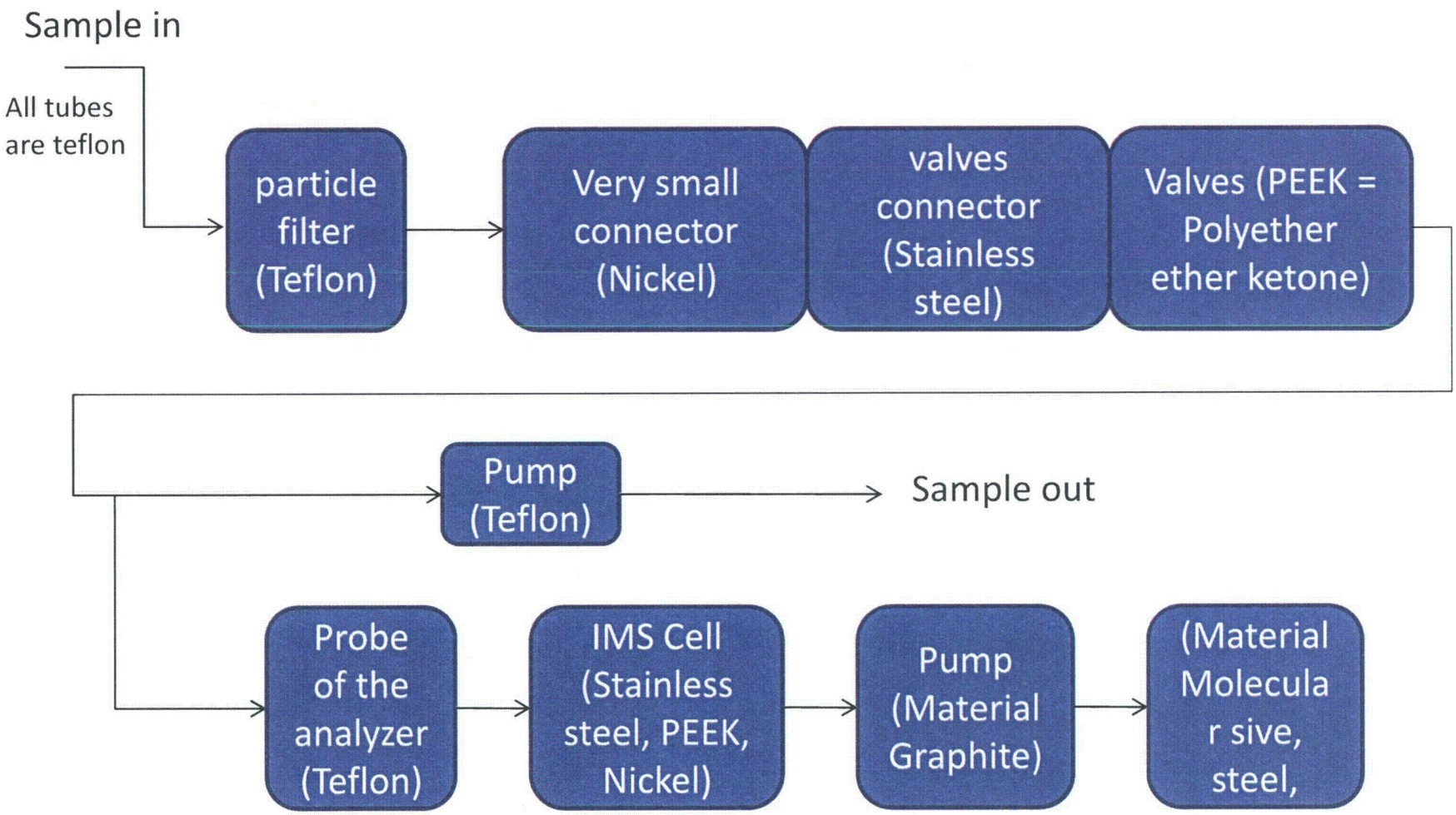
strictly confidential



strictly confidential

Maße ohne Toleranzangabe nach DIN 7168 mittel		Stückzahl	Maßstab 1 : 1
			Werkstoff / Halbzeug
2011	Datum	Name	Benennung
Bearb.	24.07.11	B.Räbiger	IMS 200i Front
Gepr.			IMS7, 19" Einschub
Norm			
Freig.			
Environics-IUT GmbH			Zeichng.-Nr. 3D IM57.05-11:01
Zust.	Änderung	Datum	Name

Materials that are exposed to sample



AUCOTEAM
INGENIEURGESELLSCHAFT FÜR AUTOMATISIERUNGS- UND COMPUTERTECHNIK BERLIN

Testing laboratory for climatic, mechanical
and corrosive environmental stress

Deutscher Akkreditierungs Rat
DAP-PL-3439.00

QUALITY TEST CERTIFICATE

according to DIN 55 350 - 18 - 4.3.4

Test report No. 8499 / 11

Client	**IUT Institut für Umwelttechnologien GmbH** Volmerstraße 7 B 12489 Berlin	
Equipment under test	**Gas monitor**	
	Type	ENVI-Stack/Pro/Air in Nema 4x
	Quantity	1 sample
	Status	May 2011
Purpose	***Tests for the certification of the dynamic mechanical resistance, the climatic stability, and the functional capability according to the specifications of the current standards and to the demands of the client.***	
Test program	***Cold***	*according to the EN 50155 §12.2.3*
	Dry heat	*according to the EN 50155 §12.2.4*
	Damp heat, cyclic	*according to the EN 50155 §12.2.5*
	Insulation test	*according to EN 50155 §12.2.9.1*
	High voltage test	*according to the EN 50155 §12.2.9.2*
	Vibration, broad band noise	*according to the IEC 61373 §8 and 9*
	Shock, half-sine	*according to the IEC 61373 §10*
Test period	06 May to 27 May 2011	
Execution /results	see pages 2 to 7	
Test results	**The tests were carried out according to the specifications of the standards and to the demands of the client.** **Further evaluation will be done by the client.**	

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AUCOTEAM GmbH Berlin
QUALITÄTSPRÜFUNG

Dipl.-Ing. R. Lein
Head of the testing laboratory

Berlin, 23 June 2011

Dipl.-Ing. (FH) G. Zieten
Test engineer

Sitz der Gesellschaft: Berlin
Amtsgericht Berlin Charlottenburg HRB 38393
Ust-ID-Nr.: DE 137 190 620
Geschäftsführer:
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1 Purpose

Test for the certification of the dynamic-mechanical stability, the climatic resistance and the functional capability of the sample according to the specifications of the current standards and to the demands of the client.

2 Equipment under test

Gas monitor

Type	ENVI-Stack/Pro/Air in Nema 4x
Quantity	1 sample
Arrival date of the sample	06 May 2011 and 25 May 2011

3 Basics

3.1 Demands of the client

3.2 Used standards

IEC 60068-1:1988 + **Corr.** 1988 + **A1**:1992 **DIN EN 60068-1**:1995-03
"Environmental testing - Part 1: General and guidance"

IEC 60068-2-1:2007 **DIN EN 60068-2-1; VDE 0468-2-1**:2008-01
"Environmental testing - Part 2-1: Tests - Test A: Cold"

IEC 60068-2-2:2007 **DIN EN 60068-2-2; VDE 0468-2-2**:2008-05
"Environmental testing - Part 2-2: Tests - Test B: Dry heat"

IEC 60068-2-27:2008 **DIN EN 60068-2-27; VDE 0468-2-27**:2010-02
"Environmental testing - Part 2-27: Tests - Test Ea and guidance: Shock"

IEC 60068-2-30:2005 **DIN EN 60068-2-30**:2006-06
"Environmental testing - Part 2-30: Tests - Test Db: Damp heat, cyclic (12 h + 12 h cycle)"

IEC 60068-2-47:2005 **DIN EN 60068-2-47**:2006-03
"Environmental testing - Part 2-47: Tests - Mounting of specimens for vibration, impact and similar dynamic tests"

IEC 60068-2-64:2008 **DIN EN 60068-2-64; VDE 0468-2-64**:2009-04
"Environmental testing - Part 2-64: Tests - Test Fh: Vibration, broadband random and guidance"

IEC 61373:2010 **DIN EN 61373; VDE 0115-106**:2011-04
"Railway applications - Rolling stock equipment - Shock and vibration tests"

EN 50155:2007 **DIN EN 50155; VDE 0115-200**:2008-03
"Railway applications - Electronic equipment used on rolling stock"

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4 Test program

4.1 Test for insulation to damp heat, cyclic

Insulation resistance measurement *according to the EN 50155 §. 12.2.9.1 and to the demands of the client*

Sample	ENVI-Stack/Pro/Air in Nema 4x not in operation
Test section	supply and output connectors (bridged) against the housing
Test voltage	500 V DC
Test duration	60 s

4.2 Damp heat, cyclic – Test Db

according to the EN 50155 §. 12.2.5, to the IEC 60068-2-30 and to the demands of the client

Sample	ENVI-Stack/Pro/Air in Nema 4x in 2nd cycle operation
Lower test temperature	(+25 ± 2)°C
relative humidity	(95 ± 3) %
Upper test temperature	(+55 ± 2)°C
relative humidity	(93 ± 3) %
Dwell time	9 h each
Temperature change duration	3 h each (0.17 K/min)
Test duration	48 h (2 cycle of 24 h each)

4.3 Insulation test after damp heat, cyclic

Sample	ENVI-Stack/Pro/Air in Nema 4x not in operation

4.3.1 *Insulation resistance measurement*

according to the EN 50155 §. 12.2.9.1 and to the demands of the client

Test section	supply and output connectors (bridged) against the housing
Test voltage	500 V DC
Test duration	60 s

4.3.2 *High voltage resistance*

according to the EN 50155 §. 12.2.9.2 and to the demands of the client

Test section	supply and output connectors (bridged) against the housing
Test voltage	1500 V AC
Test duration	60 s

4.3.3 *Insulation resistance measurement*

according to the EN 50155 §. 12.2.9.1 and to the demands of the client

Test section	supply and output connectors (bridged) against the housing
Test voltage	500 V DC
Test duration	60 s

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4.4 Dry heat - Test B

according to the EN 50155 §. 12.2.4 as well as the IEC 60068-2-2 and to the demands of the client

Sample	ENVI-Stack/Pro/Air in Nema 4x
Test duration	(+50 ± 2)°C / 6 h in operation (+60 ± 2)°C / 10 min in operation
Relative humidity	< 50 %

4.5 Cold - Test A

according to the EN 50155 §. 12.2.3 as well as the IEC 60068-2-1 and to the demands of the client

Sample	ENVI-Stack/Pro/Air in Nema 4x	
Test temperature	(-40 ± 3)°C	
Test duration	16 h	not in operation
	10 min	in operation

4.6 Vibration, broad band noise - Long term test Fh - Railway specifications

according to the EN 50155 §. 12.2.11, IEC 61373 § 9 cat.1 class A, to the IEC 60068-2-64 and to the demands of the client

Sample	ENVI-Stack/Pro/Air in Nema 4x not in operation	
Intensified test conditions	the transversal axis with the parameters for the longitudinal axis, because the mounting position is only defined in the vertical axis.	
Frequency range	5 - 150 Hz	
	vertical	transversal / longitudinal
Effective acceleration	5.90 m/s²	3.90 m/s²
5 - 20 Hz	1.034 m²/s³	0.452 m²/s³
150 Hz	0.019 m²/s³	0.008 m²/s³
Number of axes	3	
Test duration	15 h (5 h in each axis)	

4.7 Shock test - Test Ea - Railway specifications

according to the EN 50155 §. 12.2.11, IEC 61373 § 10 cat.1 class A, to the IEC 60068-2-27 and to the demands of the client

Sample	ENVI-Stack/Pro/Air in Nema 4x not in operation	
Intensified test conditions	the transversal axis with the parameters for the longitudinal axis, because the mounting position is only defined in the vertical axis.	
	vertical	transversal / longitudinal
Acceleration	30 m/s²	50 m/s²
Pulse duration	30 ms	30 ms
Shock type	half-sine	
Number of directions	6 (3 axes with 2 directions each)	
Number of shocks	18 (3 shocks per direction)	

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4.8 Vibration, broad band noise - Functional test Fh – Railway specifications

according to the EN 50155 §. 12.2.11, IEC 61373 § 8 cat. 1 class A, to the IEC 60068-2-64 and to the demands of the client

Sample	ENVI-Stack/Pro/Air in Nema 4x in operation
Intensified test conditions	the transversal and longitudinal axes with the parameters for the vertical axis.
Frequency range	5 - 150 Hz
	vertical / transversal / longitudinal
Effective acceleration	0.75 m/s²
5 - 20 Hz	0.0164 m²/s³
150 Hz	0.0003 m²/s³
Number of axes	3
Test duration	30 min (10 min per axis)

Functional test (sections 4.1 to 4.8)

Before and after the tests, as well as during the test in operation, the sample will be connected to voltage and the functional capability shall be checked according to the demands of the client.

Visual inspection (sections 4.1 to 4.8)

Before and after each individual test the sample will be examined for the presence of cracks, breaks, distortions and other mechanical and thermal damage or any additional alterations.

Failure criteria

- visible damage
- mechanical damage or any other alterations
- functional impairments

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5 Execution

The climatic tests of the sample were carried out according to the test program (sections 4.1 to 4.8) in compliance with the specifications of the current standards and with the demands of the client.

Dynamic-mechanical tests – Attachment of the sample

During the dynamic-mechanical tests the sample was attached directly onto the vibration platform or sliding table using straps or braces.

- vertical axis - S
- transversal axis - Q
- longitudinal axis - L

The dynamic-mechanical tests were carried out according to the test program in the following order:

1. Vibration, broad band noise – Long-term test Fh	longitudinal axis	according to 4.6
2. Shock test - Test Ea	longitudinal axis	according to 4.7
3. Vibration, broad band noise - Functional test Fh	longitudinal axis	according to 4.8
4. Vibration, broad band noise – Long-term test Fh	transversal axis	according to 4.6
5. Shock test - Test Ea	transversal axis	according to 4.7
6. Vibration, broad band noise - Functional test Fh	transversal axis	according to 4.8
7. Vibration, broad band noise – Long-term test Fh	vertical axis	according to 4.6
8. Shock test - Test Ea	vertical axis	according to 4.7
9. Vibration, broad band noise - Functional test Fh	vertical axis	according to 4.8

Pictures *see appendix 3*

Electrical tests

All connecting cables were bridged during the insulation resistance measurement and the high voltage test. The measurements were performed between the bridged cable and the housing of the sample.

The following measurement and test devices were used in the tests:

Name	Type	Serial-No.	Maker
Shaker	TIRAvib 5142	1997	TIRA
Acceleration sensor	352C22	116992	PCB
Acceleration sensor	352C22	112861	PCB
Climatic test chamber 5	KPK 630	020/03	Feutron

Functional tests (sections 4.1 to 4.8)

Before and after the tests, as well as during the test in operation the sample was connected to 230 V AC voltage and the functional capability was checked according to the demands of the client

Visual inspection (sections 4.1 to 4.8)

Before and after each individual test the sample was examined for the presence of cracks, breaks, distortions and mechanical or thermal damage, and any other alterations.

Failure criteria

- visible damage
- mechanical damage or any other alterations
- functional impairments

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6 Results

6.1 Climatic tests (according to sections 4.2, 4.4 and 4.5)

During the climatic tests of the ***sample*** with

- ***damp heat, cyclic*** *(25°C/95 % r.H. and 55°C/93 % r.H.)* - ***Test Db***
- ***dry heat*** *(+ 70°C, 8 h / +85°C, 10 min)* - ***Test B***
- ***Cold*** *(- 40°C, 4.25 h)* - ***Test A***

no mechanical or climatic damage was detected.

The functional capability was ensured before, partially during and after the tests.

6.2 Insulation test

The insulation resistance measurement after all tests was passed.
At all times, insulation resistance values > 1 GΩ were recorded.

6.3 High voltage test

The high voltage test (0.5 kV) led to neither high voltage flash-overs nor to an increased current flow.

6.4 Dynamic mechanical tests (according to sections 4.6 to 4.8)

In the dynamic-mechanical tests of the ***samples*** with

- ***Vibration, broad band noise*** *–(* long-term test) - ***Test Fh***
- ***Shock, half-sine*** - ***Test Ea***
- ***Vibration, broad band noise*** *(functional test)* - ***Test Fh***

no mechanical damage such as cracks, breaks or distortions were detected.

The functional capability of the sample was ensured before, after and during the test.

The tests were carried out according to the specifications of the standards and to the demands of the client.

Further evaluation will be done by the client.

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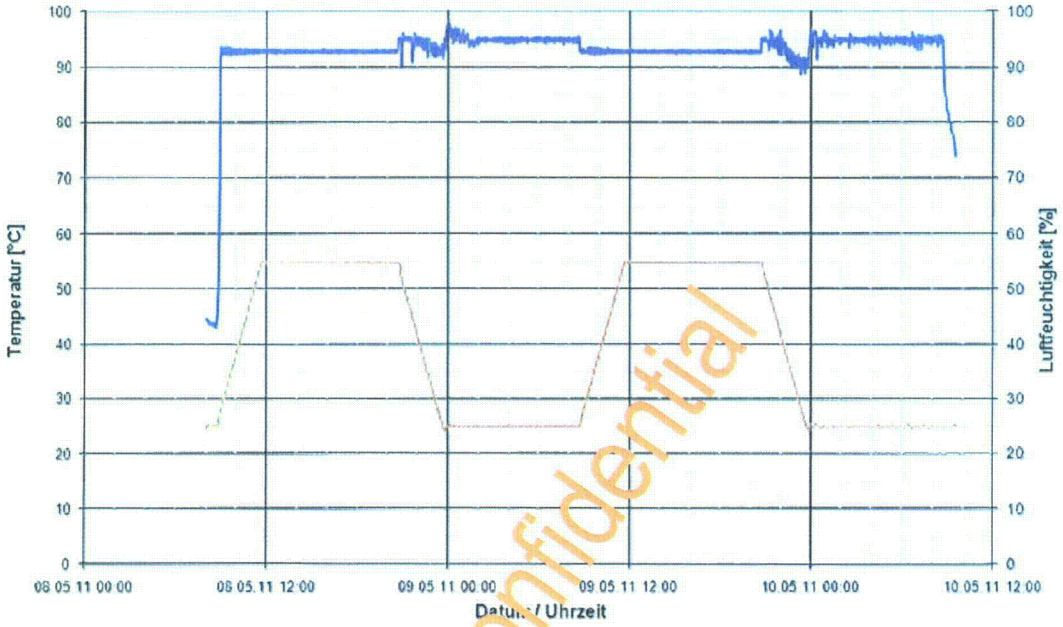
The results of the tests refer only to the above mentioned equipment under test. This report, or individual pages of this test report, may only be copied following the written consent of the testing laboratory. This test report No. 8499 / 11 includes 7 pages and 3 appendices.

Appendix 1 –climatic records
Appendix 2 - vibration and shock records
Appendix 3 - pictures



Temperature and humidity behaviour inside the climatic test chamber KPK 5 during the test with damp heat, cyclic
(+25°C / +55°C / 95 % r.H. (2 cycles / each 24 h), according to 4.1

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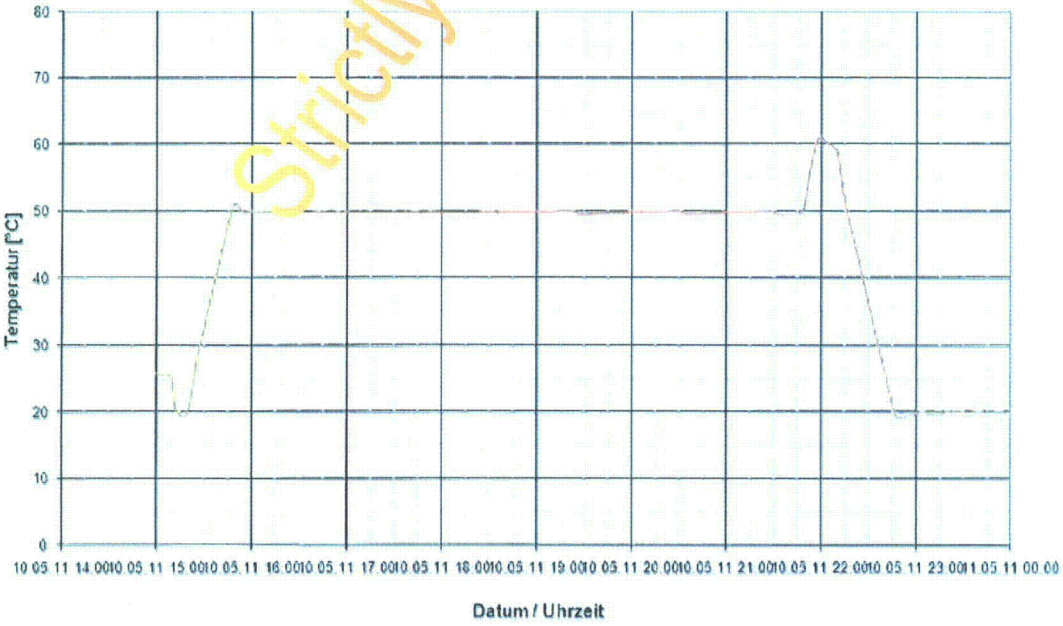
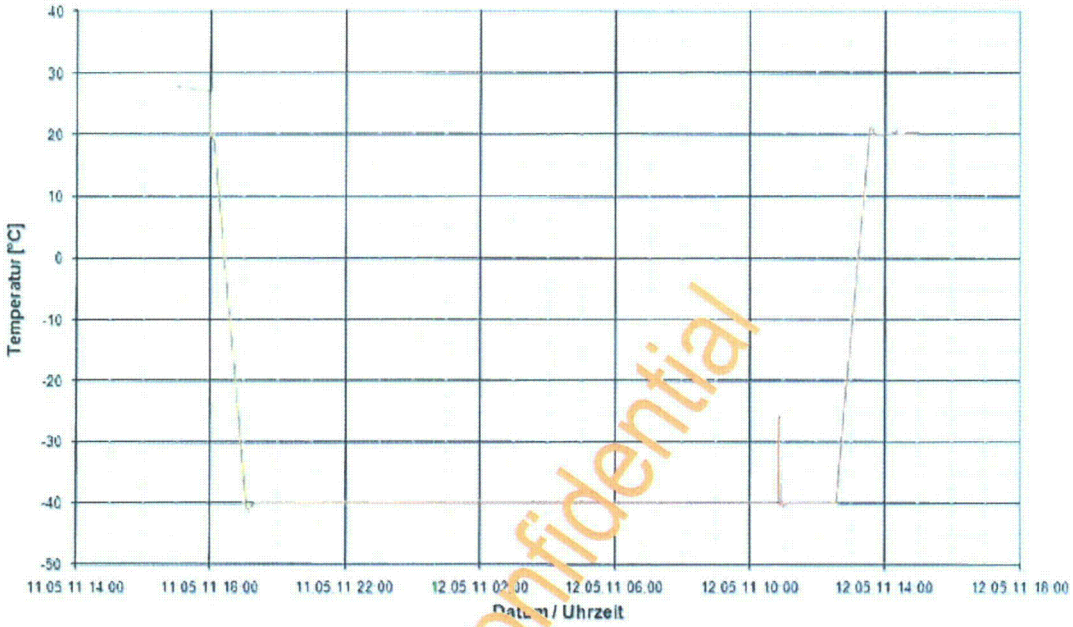


Temperature behaviour inside the climatic test chamber KPK 5 during the test with heat
(+50°C / 6h, +60°C / 10min), according to 4.4



Temperature behaviour inside the climatic test chamber KPK 5 during the test with cold
(-40°C / 16h), according to 4.5

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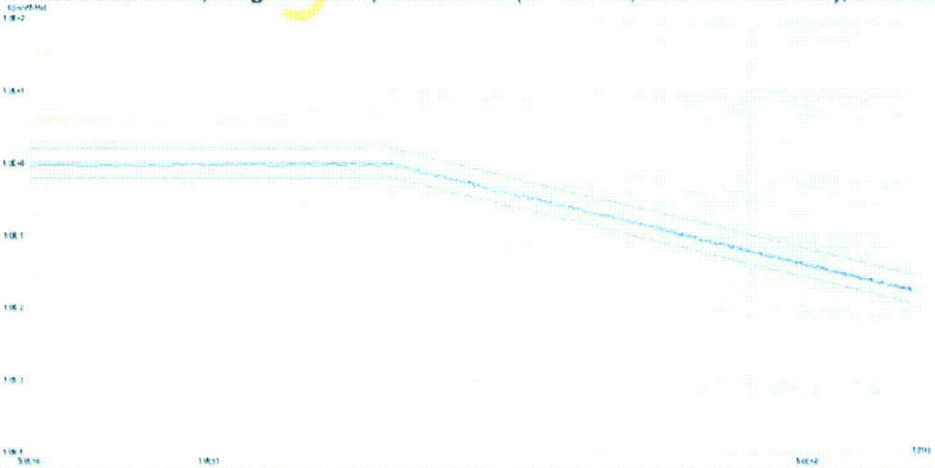
Broad band noise, long-term test, longitudinal (5 - 150 Hz, 2.90 m/s² effective), according to 4.6

Broad band noise, long-term test, transversal (5 - 150 Hz, 3.90 m/s² effective), according to 4.6



Broad band noise, long-term test, vertical (5 - 150 Hz, 5.90 m/s² effective), according to 4.6

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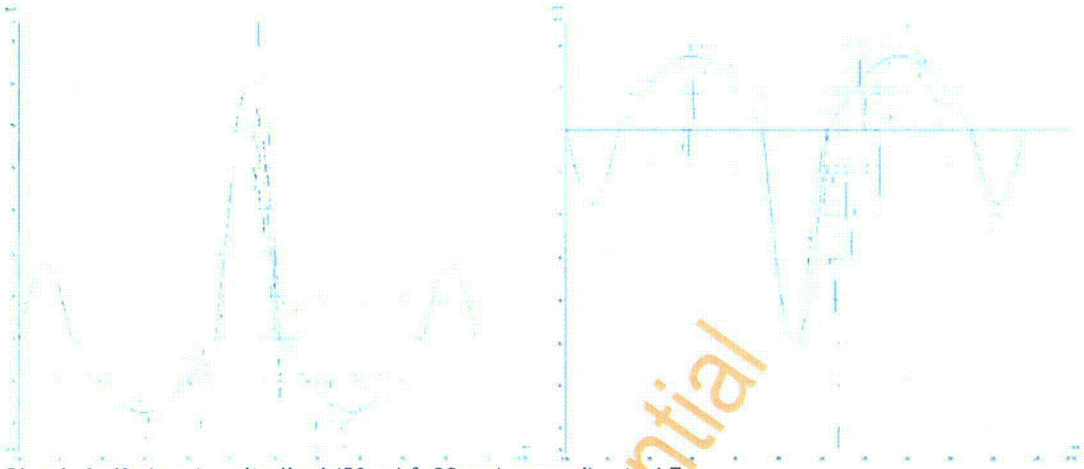
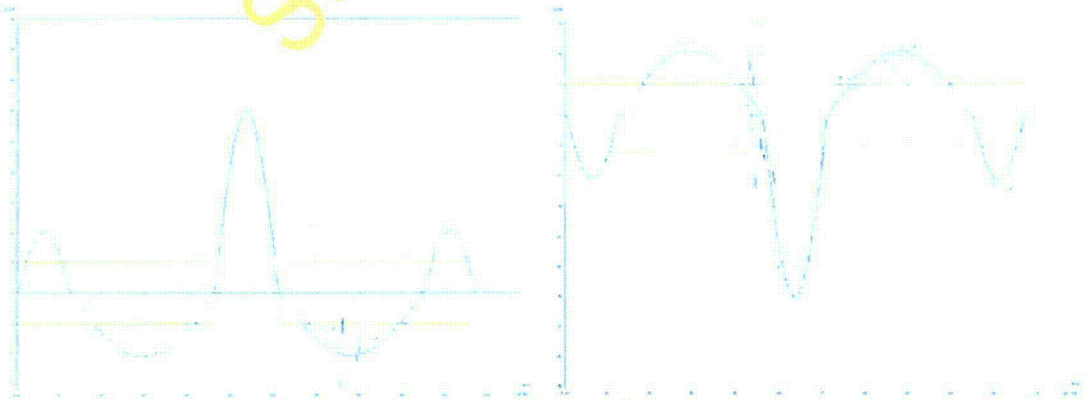


Shock, half-sine, longitudinal (50 m/s², 30 ms), according to 4.7

Shock, half-sine, transversal (50 m/s², 30 ms), according to 4.7



Shock, half-sine, vertical (30 m/s², 30 ms), according to 4.7

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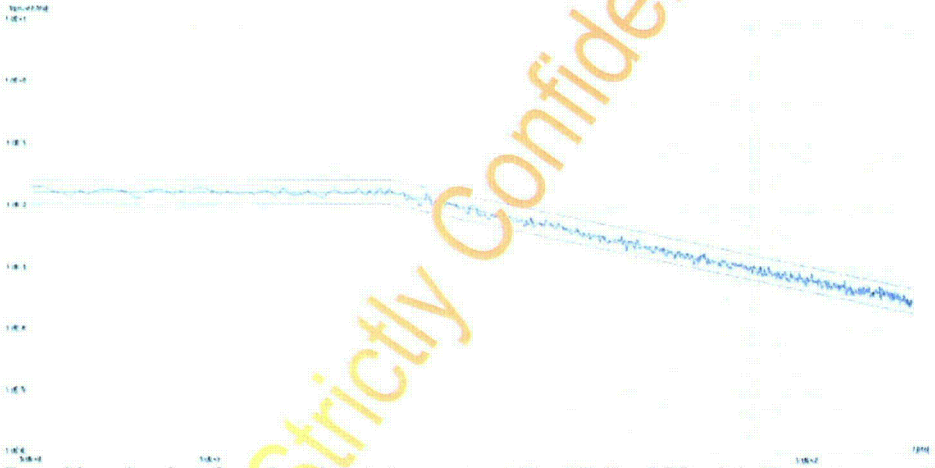
Broad band noise, functional test, vertical (5 - 150 Hz, 0.75 m/s² effective), according to 4.8



Broad band noise, functional test, transversal (5 - 150 Hz, 0.75 m/s² effective), according to 4.8

Broad band noise, functional test, longitudinal (5 - 150 Hz, 0.75 m/s² effective), according to 4.8

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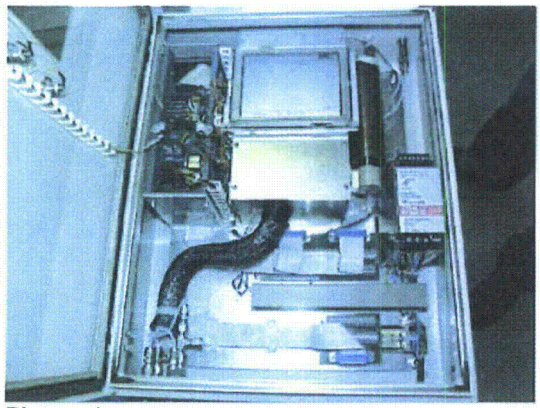
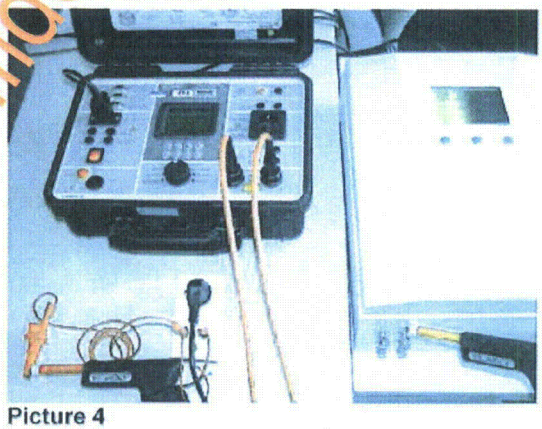
Pictures



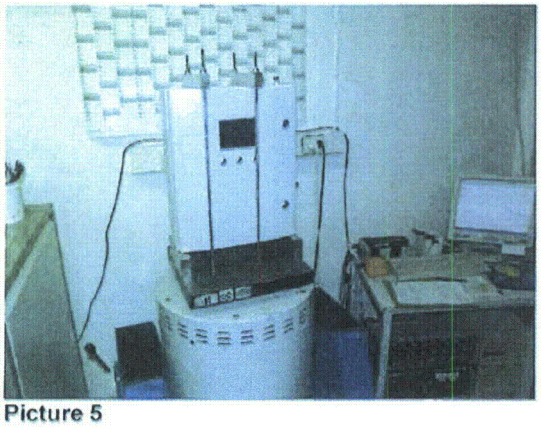
Picture 1
ENVI-Stack/Pro/Air in Nema 4x
before all tests

Picture 2
ENVI-Stack/Pro/Air in Nema 4x
inside the climatic test chamber - Tests A, B and Db
before the climatic tests

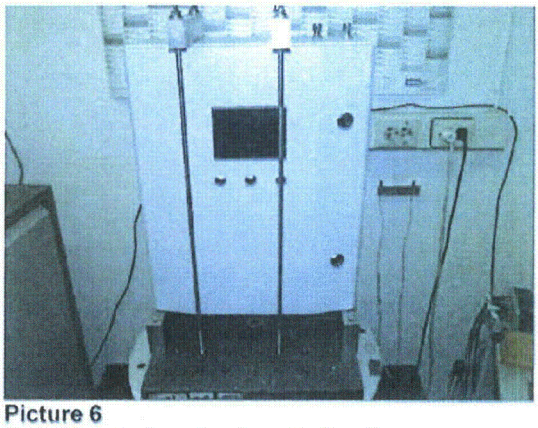
Picture 3
ENVI-Stack/Pro/Air in Nema 4x
with portable compact tester
during the insulation resistance measurement



Picture 4
ENVI-Stack/Pro/Air in Nema 4x
with portable compact tester
during the high voltage test



Picture 5
Samples during shock and vibration
on the shaker
before the broad band noise in the S – axis



Picture 6
Samples during shock and vibration
on the shaker
before the broad band noise in the S – axis

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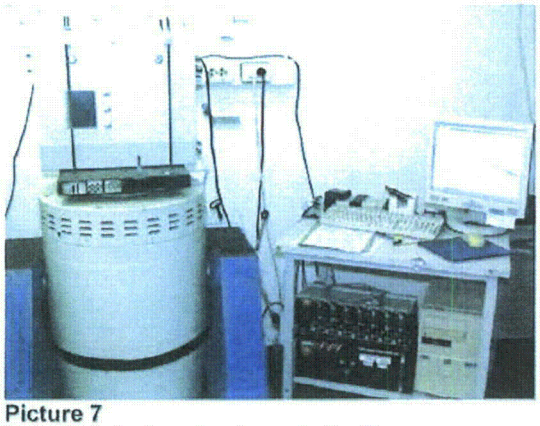
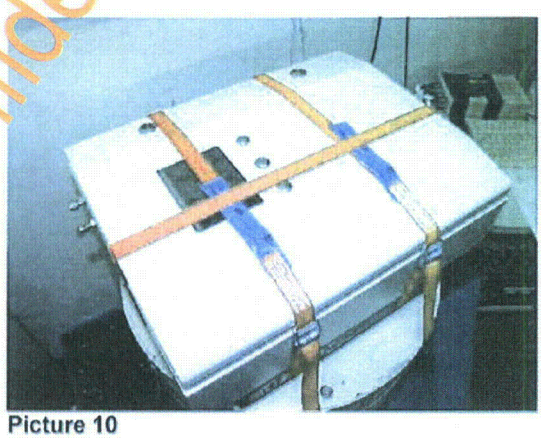


Picture 7
Samples during shock and vibration on the shaker
before the broad band noise in the Q – axis

Picture 8
Samples during shock and vibration on the shaker
before the broad band noise in the Q – axis

Picture 9
Samples during shock and vibration on the shaker
before the broad band noise in the L – axis



Picture 10
Samples during shock and vibration on the shaker
before the broad band noise in the L – axis

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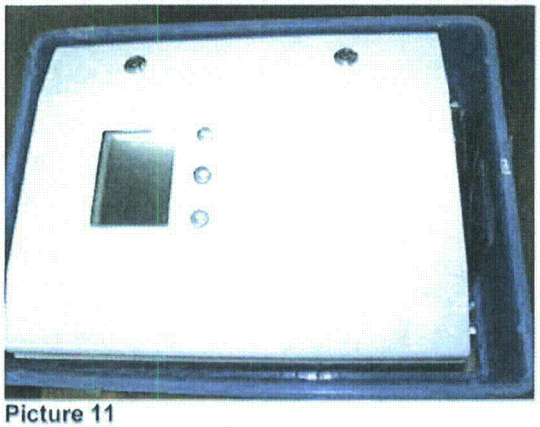

Picture 11
ENVI-Stack/Pro/Air in Nema 4x
after all tests

Nach DIN EN ISO/IEC17025:2000 durch die DAP Deutsches Akkreditierungssystem Prüfwesen GmbH akkreditiertes Prüflaboratorium
Die Akkreditierung gilt für die in der Urkunde aufgeführten Prüfverfahren.
Deutscher Akkreditierungs Rat DAR
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Prüfbericht- Nr.: 11063-4

Auftraggeber: Environics-IUT GmbH
Volmerstr. 7B
12489 Berlin

Auftrags- bzw. Probenbezeichnung des AG: ENVI Pro
Geräte-Nr. IM0411.1101

Probenahme: beim AG **Zeitpunkt:** 05.05.2011

Probenart: Wischtest, Kontaminationsprüfung

Prüfspezifikation: Freimessung nach Strahlenschutzverordnung (StrlSchV) vom 20.07.2001 gemäß Prüfanordnung PA-12-01 der IUT GmbH

Durchführung: **Nach DIN/ISO 7503, Teil 2:** Auf der äußeren Oberfläche des zu überprüfenden Gerätes wurde ein Wischtest (Glasfaserfilter GF 92 Schleicher und Schuell) auf einer Fläche von 100 cm^2 vorgenommen und auf mögliche Kontamination überprüft.

Meßgeräte: 1. Contaminator FH 40F2 zur Überprüfung der Ortsdosisleistung (ODL) in 10 cm Abstand von der Oberfläche
2. LSC TRI-CARB zur Prüfung auf Kontamination mit Hilfe einer Szintillations-Lösung (Cocktail Insta-Gel Plus)

Ergebnis:

Geräte-Nr.	Typ	Quellen-Nr.	Ortsdosisleistung µSv/h	Kontamination Bq/cm^2
IM0411.1101	ENVI Pro	22.10	< 0,1	< 0,01

Bewertung: Alle Messwerte liegen unter den nach der StrlSchV vom 20.07.2001 gesetzlich vorgeschriebenen Werten.

Berlin, den 05.05.2011

Prüfverantwortlicher

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einfache Ausfertigung

Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin

Prüfschein

Nr. 6.52 - R 244

Gegenstand:	Ionenmobilitätsspektrometer Firmenbezeichnung: Gasspurenmonitor in den Ausführungen: 1. Beta - IMS mit Gasprobenschleife 2. Beta - IMS mit Membrankammer
Hersteller und Antragsteller:	Institut für Umwelttechnologie GmbH Rudower Chaussee 5 12489 Berlin-Adlershof
Antragsunterlagen:	Bauartzeichnungen: RID3.50-02:00 vom 11.04.1997 (Driftzelle) RID4.schbet:1 vom 24.04.1997 (Gasprobenschleife) Kennz.-Nr. 6.52 - R 244/3 (Membrankammer) RID4.12-05:00/1 vom 24.04.1997 Kennz.-Nr. 6.52 - R 244/1 (Kreislauffilter) RID3.57-2:04 vom 21.04.1997 (Tritium-Strahlenquelle)
Radioaktiver Stoff:	Tritium Quellenbezeichnung: 1. I.M.S. mit Gasprobenschleife: H-3-001/96 2. I.M.S. mit Membrankammer: H-3-050/96 Aktivität: 4,44 GBq

PHYSIKALISCH-TECHNISCHE BUNDESANSTALT 47

Prüfscheine ohne Unterschrift und ohne Dienststempel haben keine Gültigkeit.
Die Prüfscheine dürfen nur unverändert weiterverbreitet werden.
Auszüge oder Änderungen bedürfen der Genehmigung der Physikalisch-Technischen Bundesanstalt.

Z 14-755 320 23-11.93

Physikalisch-Technische Bundesanstalt

Blatt 2 zum PTB-Prüfschein Nr. 6.52 - R 244

Hersteller:

Chlopin Radiuminstitut
2. Murinsky Avennue Z8
194021 St. Petersburg/Rußland
zusammen mit Antragsteller

Wesentliche Merkmale der Vorrichtung

Die Ionenmobilitätsspektrometer mit Gasprobenschleife und Membrankammer dienen der Gasspurenanalyse in Luft. Moleküle der zu untersuchenden Gase werden mit der Umgebungsluft angesaugt und gelangen entweder dosiert durch eine Gasprobenschleife mit Ventilsteuerung oder mittels Diffusion durch eine Membrane in die Driftzellle, wo sie durch die ß-Strahlung der Tritiumquelle ionisiert und auf Grund unterschiedlicher Driftgeschwindigkeiten in einem elektrischen Feld analysiert werden.

Der radioaktive Stoff Tritium (H-3) ist in Zwischengitterplätze einer 0,5 µm dicken Titanschicht eingelagert, die auf einer 2 mm dicken Scheibe aus Edelstahl 1.4301 von 10 mm Durchmesser aufgedampft ist. Auf diese Titanschicht sind als Schutzschichten zwei weitere Schichten aus Silizium (0,1µm) und Aluminium (0,5µm) aufgedampft. Die schwache ß-Strahlung des Tritiums wird von allen Teilen des Ionenmobilitätsspektrometers absorbiert, so daß nur die aus dem Gerät austretende Abluft für den Strahlenschutz von Bedeutung ist.

Zur Absorption von Tritium, das aus dem Strahler freigesetzt wird, dient eine Filterpatrone, die aus zwei Schichten Molekularsieben mit einer dazwischenliegenden Schicht aus Katalysatormaterial aufgebaut ist. Dieser Filter muß nach einer vom Hersteller angegebenen Betriebsdauer ausgewechselt werden.

Weitere Einzelheiten gehen aus den in der Physikalisch-Technischen Bundesanstalt hinterlegten Unterlagen hervor.

Prüfung der Vorrichtung

Die Bauart der oben bezeichneten Vorrichtung wurde gemäß § 22 der Verordnung über den Schutz vor Schäden durch ionisierende Strahlen (Strahlenschutzverordnug - StrlSchV) vom 30.06.1989 (BGBl. I, S.1321) in der derzeitigen Fassung geprüft.

Zu diesem Zweck wurde die Abluft jedes der beiden Geräte durch eine dreifache Kaskade von Waschflaschen geführt, die mit Flüssigszintillator gefüllt waren. Um das Abscheiden von Tritium im Flüssigszintilator durch Oxydation zu verbessern, wurde der Abluftstrom vor jeder Waschflasche über erhitztes Kupfer(II)-oxyd geführt. Dieser Aufbau ermöglichte unter gewissen Annahmen die Nachweiswahrscheinlichkeit zu berechnen. Sie betrug je Waschflasche mehr als 90%.

Physikalisch-Technische Bundesanstalt

Blatt 3 zum PTB-Prüfschein Nr. 6.52 - R 244

Prüfungsergebnis:

-1. Die Aktivitäten der in den Ionenmobilitätsspektrometer befindlichen radioaktiven Stoffe betragen weniger als das 10^6-fache der Freigrenze der Anlage IV, Tabelle IV 1, Spalte 4 der StrlSchV.

-2. Die Ortsdosisleistung in 0,1 Meter Abstand von der berührbaren Oberfläche der Ionenmobilitätsspektrometer beträgt weniger als 10 Mikrosievert durch Stunde.

-3. Bei betriebsmäßiger Beanspruchung der Ionenmobilitätsspektrometer treten bei dem **Modell mit Gasprobenschleife** nicht mehr als **20 Bq/Tag** und bei dem **Modell mit Membranfilter** nicht mehr als **8 kBq/Tag** an Tritium mit der Abluft aus.

Folgerung:

Die in den beiden Ionenmobilitätsspektrometern eingebauten Tritium-Strahler können wegen der Abgabe von Tritium mit der Abluft im Sinne der Strahlenschutzverordnung nicht als "umschlossene radioaktive Stoffe" eingestuft werden. Insofern ist eine Bauartzulassung nach § 22 der Strahlenschutzverordnung erschwert. Die Strahlenbelastung durch die Tritiumabgabe ist allerdings gering. Bei dem IMS-Gerät mit der höheren Tritiumabgabe (Membrankammer) beträgt sie höchstens 11 Mikrosievert/Jahr, gerechnet für den nur theoretisch zu konstruierenden Fall, daß alle abgegebene Tritiumaktivität von einem Erwachsenen während 2000 Arbeitsstunden im Jahr inhaliert würde. Die tatsächliche Strahlenbelastung ist aber wegen der Verteilung des Tritiums in der Raumluft nur ein Bruchteil des errechneten Wertes. Das Strahlenschutzziel der Anlage VI Abs. 1 der Strahlenschutzverordnung ist erreicht, so daß eine Zulassung nach § 22, Abs. 3 der StrlSchv, evtl. nach Rücksprache mit dem Länderausschuss für Atomkernenergie - Fachausschuß Strahlenschutz, empfohlen werden kann.

Die in die IMS-Geräte eingebauten Filter reduzieren die abgegebene Tritiumaktivität in erheblichen Maß. Die vom Hersteller angegebene Einsatzdauer der Filter sollte daher beachtet werden und für rechtzeitigen Austausch im Dauerbetrieb gesorgt werden.

PHYSIKALISCH-TECHNISCHE BUNDESANSTALT 47

Physikalisch-Technische Bundesanstalt

Blatt 4 zum PTB-Prüfschein Nr. 6.52 - R 244

Hinweis

Die 1. Ausfertigung dieses Prüfscheines wurde an die

Senatsverwaltung für Gesundheit
und Soziales
Abteilung V
-Referat VE - Strahlenschutz-
An der Urania 12
10787 Berlin

als Zulassungsbehörde übersandt.

Braunschweig, 11.05.1998

E. Funck

E. Funck

PHYSIKALISCH-TECHNISCHE BUNDESANSTALT 47

7.14/7.00 32 1 BAUS 93

Senatsverwaltung für Gesundheit und Soziales, Oranienstr. 106, 10969 Berlin

Zulassungsschein B - 04 / 98

I.

Gemäß § 22 Abs. 1 in Verbindung mit Anlage VI Nr. 1 der Strahlenschutzverordnung (StrlSchV) vom 13. Oktober 1976 in der Neufassung der Bekanntmachung vom 30. Juni 1989 wird dem

Institut für Umwelttechnologie GmbH (I.U.T.)
Rudower Chaussee 5
12489 Berlin-Adlershof

die Zulassung der Bauart für die nachstehend beschriebene Vorrichtung erteilt:

Gegenstand:	Ionenmobilitätsspektrometer
Firmenbezeichnung:	Gasspurenmonitor in den Ausführungen: 1. Beta - IMS mit Gasprobenschleife 2. Beta - IMS mit Membrankammer
Hersteller und Antragsteller:	Institut für Umwelttechnologie GmbH (I.U.T.) Rudower Chaussee 5 12489 Berlin-Adlershof
Radioaktiver Stoff:	Tritium
Aktivität:	Maximal 4,44 GBq
Hersteller:	Chlopin Radiuminstitut 2. Murinsky Avennue Z8 194021 St. Petersburg / Rußland zusammen mit dem Antragsteller
Quellenbezeichnung:	1. I.M.S. mit Gasprobenschleife: H-3-001/96 2. I.M.S. mit Membrankammer. H-3-050/96
Verwendungszweck:	Nachweis von Gasspuren in Luft
Befristung:	Die Zulassung ist befristet bis zum 01. Juni 2008.

II.

Zulassungsbestandteile:

1. Antrag dem Institut für Umwelttechnologie GmbH (I.U.T.) vom 20.06.1997.
2. Prüfschein der Physikalsch-Technischen Bundesanstalt Nr. 6.52 - R 244 vom 11.05.1998

3. Bauartzeichnungen:
   RID3.50-02:00 vom 11.04.1997 (Driftzelle), RID4.schbet :1 vom 24.04.1997 (Gasprobenschleife), Kennz.-Nr. 6.52-R 244/3 (Membrankammer), RID4.12-05:00/1 vom 24.04.1997 Kennz.-Nr. 6.52-R 244/1 (Kreislauffilter), RID 3.57-2:04 vom 21.04.1997 (Tritium-Strahlenquelle).

III.

Wesentliche Merkmale der Vorrichtung

Die Ionenmobilitätsspektrometer mit Gasprobenschleife und Membrankammer dienen der Gasspurenanalyse in Luft. Moleküle der zu untersuchenden Gase werden mit der Umgebungsluft angesaugt und gelangen entweder dosiert durch eine Gasprobenschleife mit Ventilsteuerung oder mittels Diffusion durch eine Membrane in die Driftzelle, wo sie durch die β-Strahlung der Tritiumquelle ionisiert und aufgrund unterschiedlicher Driftgeschwindigkeiten in einem elektrischen Feld analysiert werden.

Der radioaktive Stoff Tritium (H-3) ist in Zwischengitterplätze einer 0,5 µm dicken Titanschicht eingelagert, die auf einer 2 mm dicken Scheibe aus Edelstahl 1.4301 von 10 mm Durchmesser aufgedampft ist. Auf diese Titanschicht sind als Schutzschichten zwei weitere Schichten aus Silizium (0,1 µm) und Aluminium (0,5 µm) aufgedampft. Die schwache β-Strahlung des Tritiums wird von allen Teilen des Ionenmobilitätsspektrometers absorbiert, so daß nur die aus dem Gerät austretende Abluft für den Strahlenschutz von Bedeutung ist.

Zur Absorption von Tritium, das aus dem Strahler freigesetzt wird, dient eine Filterpatrone, die aus zwei Schichten Molekularsieben mit einer dazwischenliegenden Schicht aus Katalysatormaterial aufgebaut ist. Dieser Filter muß nach einer vom Hersteller angegebenen Betriebsdauer ausgewechselt werden.

Weitere Einzelheiten gehen aus den in der Physikalsch-Technischen Bundesanstalt (PTB) hinterlegten Unterlagen hervor.

Prüfung der Bauart:

Mit Prüfschein Nr. 6.52 - R 244 vom 11.05.1998 hat die Physikalisch-Technische Bundesanstalt (PTB) bestätigt, daß das Strahlenschutzziel der Anlage VI Nr. 1 für das vorstehend beschriebene Ionenmobilitätsspektrometer erreicht ist. Obwohl die in den beiden Ionenmobilitätsspektrometern eingebauten Tritium-Strahler wegen der zwar geringen Abgabe von Tritium mit der Abluft streng genommen nicht der Definition „umschlossene radioaktive Stoffe" im Sinne der Strahlenschutzverordnung genügen, werden sie für diese Bauartzulassung dennoch als quasi umschlossene radioaktive Stoffe behandelt.

Prüfergebnis:

1. Die Aktivitäten der in den Ionenmobilitätsspektrometern befindlichen radioaktiven Stoffe betragen weniger als das 10^6 -fache der Freigrenze der Anlage IV, Tabelle IV 1, Spalte 4 der Strahlenschutzverordnung.

   Die Ortsdosisleistung in 10 cm Abstand von der berührbaren Oberfläche der Ionenmobilitätsspektrometer (IMS-Gerät) beträgt weniger als 10 µSv/h.

2. Bei betriebsmäßiger Beanspruchung der Ionenmobilitätsspektrometer treten bei dem IMS-Gerät mit Gasprobenschleife nicht mehr als 20 Bq/Tag und bei dem IMS-Gerät mit Membranfilter nicht mehr als 8 kBq/Tag an Tritium mit der Abluft aus.

IV.

Auflagen:

Die Zulassung wird gemäß § 24 StrlSchV mit folgenden Auflagen verbunden:

1. Jedes Ionenmobilitätsspektrometer muß deutlich sichtbar und dauerhaft mit dem Bauartzeichen B - 04 / 98 und dem Strahlenzeichen gekennzeichnet sein. Außerdem sind das Radionuklid und die Aktivität (Tritium: 4,44 GBq) anzugeben.
2. Vor der Auslieferung ist jedes Ionenmobilitätsspektrometer einer Qualitätskontrolle (Abnahmeprüfung) daraufhin zu unterziehen, ob es bezüglich der für den Strahlenschutz wesentlichen Merkmale dieser Bauartzulassung entspricht.
3. Das Ergebnis der Qualitätskontrolle ist in einer Prüfliste aufzuzeichnen, die folgende Angaben enthalten soll:
   - Laufende Fabrikations-Nummer,
   - Max. Ortsdosisleistung in 10 cm Abstand von der Oberfläche der Ionenmobilitätsspektrometer,
   - Ergebnis der Kontaminationsprüfung (Wischtest),
   - Prüfdatum,
   - Unterschrift des für die Abnahmeprüfung Verantwortlichen.
4. Zur Überwachung der Qalitätskontrolle wird das Institut für Strahlenschutz und Qualitätssicherung GmbH (ISQ), Kyllmannstr. 12b, 12203 Berlin bestimmt.
5. Jedem Erwerber eines der vorgenannten und zugelassenen IMS-Geräte ist ein Abdruck des Zulassungsscheines auszuhändigen, auf dem das Ergebnis der Qualitätskontrolle bestätigt ist. Außerdem ist jedem IMS-Gerät eine Betriebsanleitung in deutscher Sprache beizufügen, in der insbesondere auf die dem Strahlenschutz dienenden Maßnahmen und die Pflichten des Betreibers hingewiesen wird.
6. Die zur Reduzierung der mit der Abluft entweichenden Tritiumaktivität in den IMS-Geräten eingebauten Filter sind vom Hersteller oder von einer von ihm autorisierten Firma spätestens halbjährlich auszutauschen. Eine entsprechende Verpflichtung muß im Kauf- oder Überlassungsvertrag enthalten sein.

V.

Pflichten des Inhabers einer zugelassenen Vorrichtung:

1. Ein Abdruck dieses Zulassungsscheines und die Betriebsanleitung sind bei der zugelassenen Vorrichtung bereitzuhalten und der Aufsichtsbehörde auf Verlangen vorzulegen.
2. Auf die Pflichten des Inhabers der Vorrichtung nach § 4 Abs. 1, § 27 und § 79 StrlSchV wird besonders hingewiesen.

Berlin, den 27. Mai 1998

Senatsverwaltung für Gesundheit und Soziales
Im Auftrag

Dr. Scheffler

Senatsverwaltung für Gesundheit und Soziales 16 Berlin

Senatsverwaltung für Arbeit,
Soziales und Frauen

Berlin

Senatsverwaltung für Arbeit, Soziales und Frauen, Oranienstrasse 106, 10969 Berlin

1. Nachtrag zum Zulassungsschein B - 04/98

Gemäß § 23 der Strahlenschutzverordnung (StrlSchV) vom 13. Oktober 1976 in der Fassung der Bekanntmachung vom 30. Juni 1989 (BGBl. I S. 1321; ber. S. 1926) zuletzt geändert durch 4. VO zur Änderung der StrlSchV vom 18.08.1997 (BGBl. I S. 2113) wird auf Antrag des Zulassungsinhabers vom 11. Februar 2000 die erteilte Bauartzulassung B - 04/98 vom 27. Mai 1998 aufgrund der Umbenennung der Anschrift wie folgt geändert:

Zulassungsinhaber und Hersteller des Ionenmobilitätsspektrometers (Gasspurmonitor):

Institut für Umwelttechnologien GmbH (I.U.T.)
Volmerstr. 9 B
12489 Berlin

Soweit durch diesen Bescheid nicht geändert, gelten die im Zulassungsschein B-04/98 vom 27. Mai 1998 aufgeführten Zulassungstatbestände, Merkmale, Auflagen und Hinweise unverändert fort.

Wenn nicht rechtzeitig eine Verlängerung der Befristung nach § 23 Abs. 2 StrlSchV beantragt wird, ist der Zulassungsschein mit Fristablauf der Zulassungsbehörde unaufgefordert zurückzusenden.

Rechtsbehelfsbelehrung

Gegen diesen Bescheid ist die Klage vor dem Verwaltungsgericht zulässig. Sie ist innerhalb eines Monats nach Zustellung dieses Bescheides beim Verwaltungsgericht Berlin. Kirchstr. 7, 10557 Berlin, schriftlich oder zur Niederschrift des Urkundsbeamten einzulegen; der Klageschrift soll eine Abschrift beigefügt werden. Die Klage ist gegen das Land Berlin, vertreten durch die Senatsverwaltung für Arbeit, Soziales und Frauen, zu richten.

Es wird darauf hingewiesen, dass bei schriftlicher Klageeinlegung die Klagefrist nur dann gewahrt ist, wenn die Klage innerhalb dieser Frist beim Verwaltungsgericht eingegangen ist.

Berlin, den 09. März 2000

Im Auftrag

Beiha

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Evaluation of repeatability
With ENVI Stack
- APPLICATION Test report No 3 –

Problem:

- Investigation of reproducibility in terms of measurement of HCl from a stable source.

Devices / materials

- Envi Stack
- cylinder with synthetic air
- cylinder with HCL test gas 46 ppmv
- MFCs

Evaluation:

During the whole experiment it is essential to work under same conditions:

- the same measurement procedure
- the same observer
- the same measuring instrument, used under the same conditions
- the same location
- same concentration (appr. 265 ppb(v))
- repetition over a short period of time.

1) spectrum recording under normal conditions (air drift flow)
2) connecting of a T-tubing with access to synthetic air an HCL
3) supplying a constant flow and spectrum recording
4) disconnecting the HCL test gas flow (restore normal conditions)
5) repetition of pint 3) and 4) within a given interval till there are enough reference values

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Results:

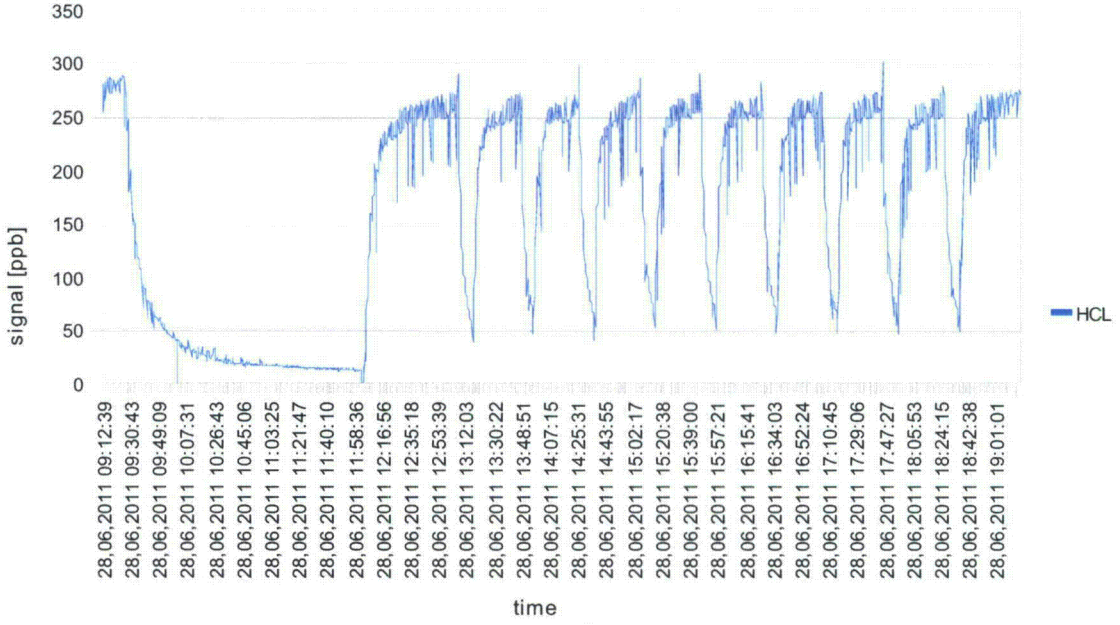

figure 1: run of the recorded signal

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	gas	time
1	Ambient air: test gas (HCL):	8,27 a.m. 12,02 p.m.
2	Ambient air: test gas (HCL):	13,05 p.m. 13,15 p.m.
3	Ambient air: test gas (HCL):	13,46 p.m. 13,55 p.m.
4	Ambient air: test gas (HCL):	14,25 p.m. 14,35 p.m.
5	Ambient air: test gas (HCL):	15,05 p.m. 15,15 p.m.
6	Ambient air: test gas (HCL):	15,45 p.m. 15,55 p.m.
7	Ambient air: test gas (HCL):	16,25 p.m. 16,35 p.m.
8	Ambient air: test gas (HCL):	17,05 p.m. 17,15 p.m.
9	Ambient air: test gas (HCL):	17,45 p.m. 17,55 p.m.
10	Ambient air: test gas (HCL):	18,25 p.m. 18,35 p.m.

table 1: change of the measured gas

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time	result
28,06,2011 09:24:50 - 28,06,2011 09:27:46	266,5
28,06,2011 13:02:30 - 28,06,2011 13:05:29	259,1
28,06,2011 13:43:31 - 28,06,2011 13:46:28	260,7
28,06,2011 14:22:35 - 28,06,2011 14:25:31	265,6
28,06,2011 15:02:36 - 28,06,2011 15:05:32	266,3
28,06,2011 15:42:36 - 28,06,2011 15:45:33	263,6
28,06,2011 15:45:33 - 28,06,2011 16:25:31	260,1
28,06,2011 17:02:14 - 28,06,2011 17:05:10	246,3
28,06,2011 17:42:33 - 28,06,2011 17:45:30	258
28,06,2011 18:22:37 - 28,06,2011 18:25:33	261,4
28,06,2011 19:02:59 - 28,06,2011 19:05:56	262,7

table 2: average of single results

Arithmetic average of all results: 260,94 ppb(v)
Standard deviation: 5,65 ppb(v)

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Discussion:

It was proved, that the ENVI Stack is able to detect/ measure HCl from a stable source (appr. 265 ppb(v)) with a good stability and highly reproducible.

July 1st

Simon Bockisch