MIRION
TECHNOLOGIES

# Tritium and Other Beta Emitters Monitoring Solutions

# PRODUCT CATALOG

Company presentation

# Mirion Technologies (Premium Analyse)

Since more than 25 years, Mirion Technologies (Premium Analyse) has been one of the leaders on the market of radioactive gases monitoring, and more specially in tritium monitoring. The monitors are mainly focused on the nuclear industry as well as medical industry.

The company is innovation-driven with the permanent objective of developing the products and services portfolio.

The monitors are:

- Manufactured in our workshop
- Designed by our internal R&D team
- Tested and controlled in our conformity lab
- Can be calibrated and verified with tritium gas in our Cofrac-certified laboratory, according to NF EN ISO/CEI 17025:2017 standard (accreditation n° 1-6856*)

Thanks to the complete production line mastery, combined with a long-term acquired know-how, Mirion Technologies (Premium Analyse) has been granted the status of precursor and can handle leading edge technology.


PREMIUM Analyse
always one idea ahead

cofrac ESSAIS

* accrediation details available on: www.cofrac.fr/en


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# Monitors Range

| Monitor ref. | Version | Vol. | 1 kBq/m³ | 1 MBq/m³ | 1 GBq/m³ | 1 TBq/m³ | 1 PBq/m³ |
|---|---|---|---|---|---|---|---|
| **B IONIX 3** | | | | | | | |
|  | **CMP** | 300 cc | 6 kBq/m³ to 6 TBq/m³<br>*162 nCi/m³ to 162 Ci/m³* | | | | |
| | | | LD (2σ) : 30 kBq/m³<br>*0.81 µCi/m³* | | | | |
| | **MES** | 660 cc | 3 kBq/m³ to 3 TBq/m³<br>*82 nCi/m³ to 82 Ci/m³* | | | | |
| | | | LD (2σ) : 12,5 kBq/m³<br>*0.33 µCi/m³* | | | | |
| **M IONIX 2** | | | | | | | |
|  | **XQS** | 4 200 cc | 2,1 kBq/m³ to 2,1 GBq/m³<br>*54 nCi/m³ to 54 Ci/m³* | | | | |
| | | | LD (2σ) : 10 kBq/m³<br>*0.27 µCi/m³* | | | | |
| | **XCS** | 4 200 cc | 2,1 kBq/m³ to 2,1 GBq/m³<br>*54 nCi/m³ to 54 Ci/m³* | | | | |
| | | | LD (2σ) : 15 kBq/m³<br>*0.41 µCi/m³* | | | | |
| **C IONIX 3** | | | | | | | |
|  | **BLX** | 195 cc | 10 kBq/m³ to 10 TBq/m³<br>*0.27 µCi/m³ to 270 Ci/m³* | | | | |
| | **BMX** | 660 cc | 3,2 kBq/m³ to 3,2 TBq/m³<br>*86 nCi/m³ to 86 Ci/m³* | | | | |
| | **EXX** | 4 200 cc | 2 kBq/m³ to 2 GBq/m³<br>*54 nCi/m³ to 54 Ci/m³* | | | | |
| | | | LD (2σ) : from 10 kBq/m³<br>*from 0,27 µCi/m³* | | | | |

# Samplers Range


HT IONIX 22

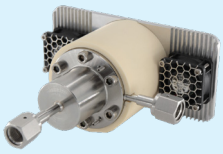
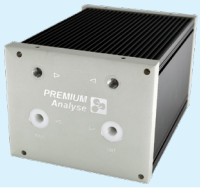
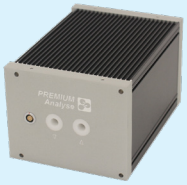

HC IONIX 22


The HT IONIX tritium and HC IONIX* carbon samplers:

- Are available in 2 and 4 bottles versions
- Offer a touch-sensitive and user friendly interface
- Only need a quick and easy preventive maintenance
- Prevent the formation of condensation outside of the bottles
- Have a limited footprint and a weight reduced to its minimum (<15kg)
- Can communicate with the infrastructures as well as supervision softwares and be operated from a distance
- Offer very limited liquid loss thanks to an internally-developped advanced system: Relative Humidity Compensation System (RHCS)

* still under developpement at the date of writing this document

# Detectors Range

| Monitor ref. | Volume | Preamp associated | 1 kBq/m³ | 1 MBq/m³ | 1 GBq/m³ | 1 TBq/m³ | 1 PBq/m³ |
|---|---|---|---|---|---|---|---|
| **DT D - MC 10** | 9,28 cc | | | | | | |
|  | | DT P - LN - 196 | | 19 MBq/m³ to 19 PBq/m³<br>*513 µCi/m³ to 513 kCi/m³* | | | |
| | | DT P - LN - 1A7 | | 1,9 MBq/m³ to 1,9 PBq/m³<br>*51.3 µCi/m³ to 51.3 kCi/m³* | | | |
| | | DT P - LN - 1B8 | | 190 kBq/m³ to 190 TBq/m³<br>*5.13 µCi/m³ to 5.13 kCi/m³* | | | |
| | | | | LD (2σ) : from 1 MBq/m³<br>*from 27 µCi/m³* | | | |
| **DT D - MLB** | 100 cc | | | | | | |
|  | | DT P - LN - 196 | | | 2,1 MBq/m³ to 2,1 PBq/m³ | | |
| | | DT P - LN - 1A7 | | | 210 kBq/m³ to 210 TBq/m³ | | |
| | | DT P - LN - 1B8 | | | 21 kBq/m³ to 21 TBq/m³ | | |
| | | | | | LD (2σ) : from 125 kBq/m³ | | |
| **DT D - BL2** | 195 cc | | | | | | |
|  | | Integrated | | | 10 kBq/m³ to 10 TBq/m³<br>*0.27 µCi/m³ to 270 Ci/m³* | | |
| | | | | | LD (2σ) : 45 kBq/m³<br>*1.22 µCi/m³* | | |
| **DT D - IC500** | 500 cc | | | | | | |
|  | | DT P - LN - 1A7 | | | 3.8 kBq/m³ to 3.8 TBq/m³<br>*103 nCi/m³ to 103 Ci/m³* | | |
| | | | | | LD (2σ) : 15 kBq/m³<br>*4.41 µCi/m³* | | |
| **DT D - BM8** | 660 cc | | | | | | |
|  | | Integrated | | | 3,2 kBq/m³ to 3,2 TBq/m³<br>*86 nCi/m³ to 86 Ci/m³* | | |
| | | | | | LD (2σ) : 10 kBq/m³<br>*0.27 µCi/m³* | | |
| **DT D - EXP40** | 4 200 cc | | | | | | |
|  | | Integrated | | | 2 kBq/m³ to 2 GBq/m³<br>*54 nCi/m³ to 54 mCi/m³* | | |
| | | | | | LD (2σ) : 10 kBq/m³<br>*0.27 µCi/m³* | | |
| **DT D - XPR80** | 8 000 cc | | | | | | |
|  | | DT P - LN - 1A7 | | | 2 kBq/m³ to 2 GBq/m³<br>*54 nCi/m³ to 54 mCi/m³* | | |
| | | | | | LD (2σ) : 5 kBq/m³<br>*0.135 µCi/m³* | | |

# Product Spec Sheets

MIRION TECHNOLOGIES

PREMIUM ANALYSE

# HT ionix™

*Tritium Bubblers*


Tritium bubblers are designed for the trapping of tritium HTO and HT. This method has been adapted especially for radioprotection, environment surveillance and stack release monitoring.

## FEATURES

- **High trapping efficiency**
  - HT & HTO ➔ > 95%
  - Trapping efficiency validated in laboratory
- **Simple and robust**
  - Intuitive to use
  - Limited liquid loss
  - Fast and easy set up
  - Real-time leak detection
  - No undesirable condensation
- **Easy maintenance**
  - Small footprint
  - Easy decontamination
  - Light (weight < 15 kg) and rugged
  - Only one annual maintenance required
- **Easy to use**
  - Color touch screen
  - Color identification of bottles

## DESCRIPTION

HT ionix bubblers consist of trappers designed for monitoring levels of concentration of atmospheric tritium HTO (vapour) form and HT (gas).

The HT ionix bubblers adapt to all your control applications in stacks, ventilation systems, surveillance of premises or even environmental monitoring.

These devices have been designed according to the requirements of the standards NF M60-312-1 & M60-822-1.

Easy to use, light and strong, these bubblers offer advanced features, such as:

- Reduced sample volume
- Remote control via Modbus Ethernet
- Records conditions of measurement and faults

## GENERAL CHARACTERISTICS

- The HT ionix bubblers are available in 2 versions:
  - The HT ionix 20 bubbler allows the sampling of tritium in HTO form
  - The HT ionix 22 bubbler allows the sampling of tritium in HTO from as well as gas HT after catalytic oxidation in a furnace

| | HT IONIX 20 | HT IONIX 22 |
|---|---|---|
| General characteristics | | |
| Overall dimensions | L 410 x H 315 x D 340 mm | L 510 x H 315 x D 340 mm |
| Weight | < 12 kg | < 15 kg |
| Power supply | 100-240 Vac 50-60 Hz | |
| Average power | 100 W | 460 W |
| Electrical protection | 2A fuse | |
| Dry-contact outputs | 6 outputs (flow, pump, cooling, electronic, proper functioning, state error) | 6 outputs (flow, pump, cooling, electronic, proper functioning, state error, furnace) |
| Volume of bottles | 125 mL | |
| Recommended water volume | 100 mL demineralized water | |
| Sampling circuit | | |
| Inlet filter | 1 µm fiberglass | |
| Gas I / O | 6 mm Swagelok double ring connectors | |
| Flow settings | Adjustable from 50 cc/min to 500 cc/min (3 L/h to 30 L/h) | |
| Furnace temperature settings | N.A | 450°C, max 500°C |

### Operating conditions:

- Use temperature: +2°C to +48°C *(+35°F to +118°F)*
- Storage temperature: -5°C to +70°C *(+23°F to +158°F)*
- Humidity: < 95% (without condensation)
- Protection level: IP 40


**HT ionix 20**
**2 bottles HTO tritium sampler**

## SPECIFICATION

**Gas sample circuit:**

- Flow regulated based on pressure drop
- Sampling circuit 100% made in stainless steel
- Identification of the bottles in order to limit the risk of reversal
- Setting up and removal of bottles facilitated by a standard screw (GL 45)
- Filtration of particles up to 1 micron through a front mounted easily interchangeable filter
- Mass flow meter, calibrated with a certified standard COFRAC flowmeter over the range of 50 to 500 cc/min (3 to 30 L/h)

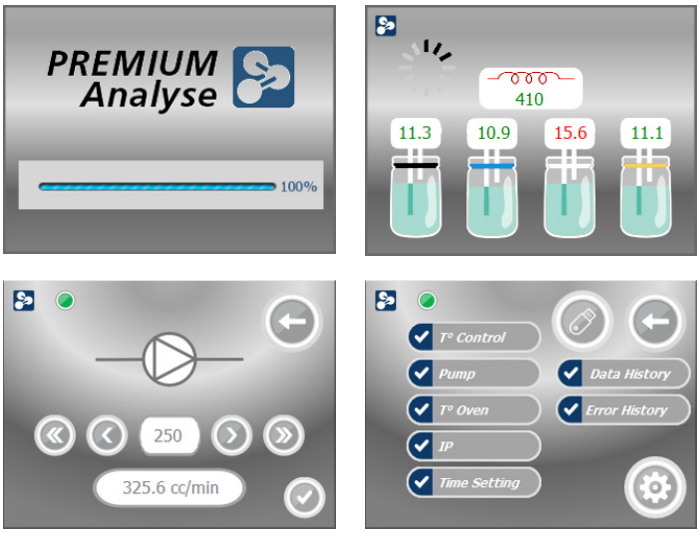
- Relative Humidity Compensation System
  - No condensation outside of the bubbler
  - Water losses very limited in all bottles even on long measurement period (up to 1 month)
- Reduced water sampling volume (from 60 mL) to limit the dilution of the sample

- Self-regulating catalytic oxidation furnace with durable catalyzer

**Electronic control:**

- Color touchscreen
  - Display of operating and sampling data (standardized flowrate, sampling duration, volume sampled...)
  - View the history of the operating states, real-time errors, sampling history...
  - Ability to reset the duration and volume sampled before each new measurement period on the main screen
- Light and sound alarm
- 4-20 mA input for external flowmeter
- Autotest at startup and during operation
- External beacon connector (additional beacon required)
- Modbus Ethernet connection allowing remote visualization of faults and the status of operation as well as unit remote control
- Dry-contact outputs for the transmission of faults (flow, pump, furnace, cooling, electronic, general failure)

Delivered with power supply cable, glass bottles, conformity certificate, user and maintenance manual and Modbus registers.




Software interface


Back of the device

## QUALIFICATIONS

- Tested in the tritium gas calibration laboratory of Mirion Technologies (PREMIUM Analyse)
- CE conformity
- Test reports available on request

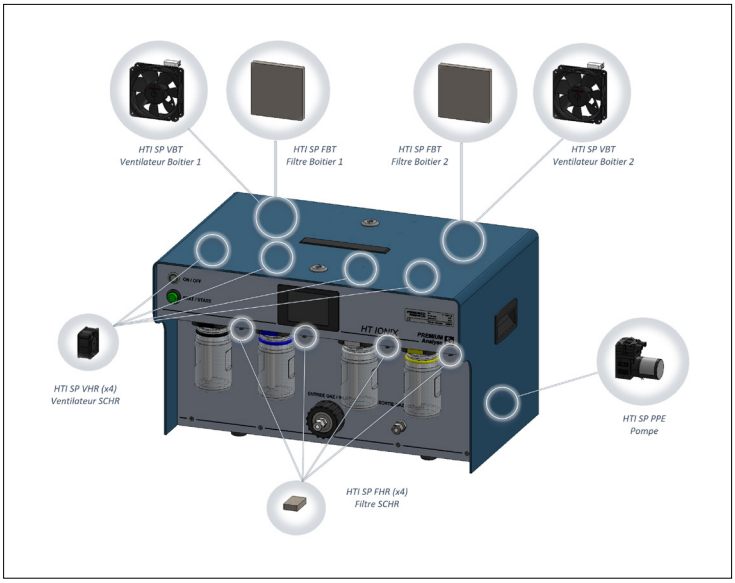
| References | |
|---|---|
| HTO tritium bubbler | HT IONIX 20 |
| HTO + HT tritium bubbler | HT IONIX 22 |

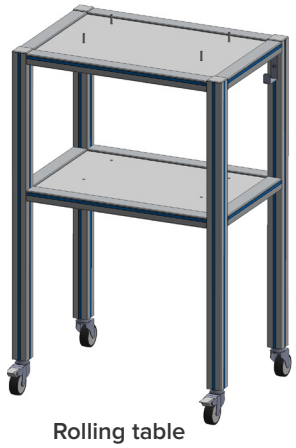
| Accessories | |
|---|---|
| Rolling table for 1 HT Ionix | HTI ACC TR1 |
| Carrying basket for 8 bottles 125mL | HTI ACC PT8 |
| Clamp alarm beacon | ACC BAL P |
| Fixed alarm beacon | ACC BAL F |
| Transport case with foam block | HTI ACC PEL |

| Consummables | |
|---|---|
| Inlet sampling filter (pack of 100) | HTI SP FPR |
| RHCS fan | HTI SP VHR |
| RHCS fan filter (pack of 12) | HTI SP FHR |
| Case fan | HTI SP VBT |
| Case fan filter (pack of 6) | HTI SP FBT |
| Pump | HTI SP PPE |

| Spare Parts | |
|---|---|
| Pack of 2 bottles | HTI SP 2FL |
| Pack of 4 bottles | HTI SP 4FL |
| RHCS head | HTI SP SCHR |
| Oxidation furnace | HTI SP FOX |
| Diving tube for 125 mL bottle | HTI SP TP125 |
| PTH probe | HTI SP PTH |
| Flowmeter | HTI SP DEB |
| Gaskets kit (pack of 2) | HTI SP JNT |
| Fuses (pack of 2) | HTI SP FUS |
| Touchscreen assembly | HTI SP ECR |
| RHCS management card | SSP HTI GHR |
| System control card | CTE HTI EPE A2 |

| Maintenance | |
|---|---|
| Annual maintenance kit without pump (FPR + FHR + FBT) | HTI MNT KIT |
| Annual maintenance kit with pump (FPR + FHR + FBT) | HTI MNT KIT PPE |
| Annual maintenance fee | HTI MNT ANN |



Rolling table
HTI ACC TR1

## CONTACT US

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SPC-175-EN-A_RMSD - 08/2021

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# β ionix 3™

*Portable Tritium Monitor*


Portable tritium monitor for radioprotection, environmental monitoring, laboratory, decommissioning...

## FEATURES

- **High performance**
  - Continuous measurement
  - Response time under 60 seconds
  - Tritium detection from 12.5 kBq/m³ *(0.33 µCi/m³)*
- **Simple**
  - Easy maintenance
  - User-friendly interface
  - Easy and fast commissioning
- **Reliable**
  - Precise and stable
  - Performance validated by the CTHIR laboratory
- **Easy to use**
  - Light and rugged
  - Color touch screen, graphical display

## DESCRIPTION

The portable monitor, B ionix has been designed for the continuous monitoring of tritium activity and other β emitters in gases.

Due to its high sensitivity, its user-friendliness and its reliability, the B ionix portable monitor ensures the radioprotection of your teams, on dismantling & construction jobs, process controls, premises monitoring...

Ready for use, this portable monitor offers some of the most advanced features, such as: graphical plotting, archiving of data, remote display of the alarms, data extraction via USB...

The B ionix portable monitor can be found in 2 versions:

- Simple measurement with a single ionization chamber of 660 cc
- Real time gamma compensated version with 2 ionization chambers of 300 cc

# B IONIX 3 | PORTABLE TRITIUM MONITOR

## FUNCTIONALITIES

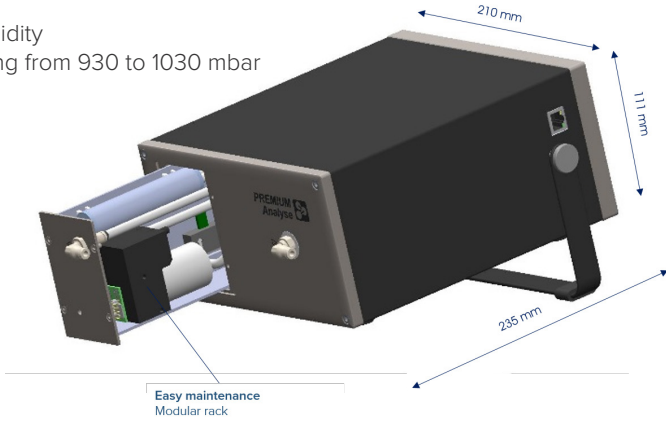
- 4 customizable alarm thresholds
- Digital display of volumetric activity
- Archiving of 32 days of measurements
- Data extraction and system update via USB stick
- Adjustment and monitoring of the flow rate with low flow detection possible
- Graphical plotting of measurements and alarm values from 8 minutes to 8 days
- Choice of volumetric activity among 15 units, with 4 customizable ones (Bq/m³, RCA, LPCA, Sv/m³...)
- Light and sound signals when pre-alarm (orange) and alarm (red) thresholds are exceeded, as well as good operation default


- Weight: 6 kgs
- Delivered with an external 24V power supply
- 6 hours autonomy 2 hours to recharge the batteries
- In option: transport case, external beacon

| Measurement characteristics in laboratory conditions (for tritium) | B IONIX 3 - MES<br>Portable tritium monitor with manual gamma compensation | B IONIX 3 - CMP<br>Portable tritium monitor with automatic gamma compensation |
|---|---|---|
| **Measurement range** | 3 kBq/m³ to 3 TBq/m³<br>*82 nCi/m³ to 82 Ci/m³* | 6 kBq/m³ to 6 TBq/m³<br>*162 nCi/m³ to 162 Ci/m³* |
| **Limit of detection (2σ)**<br>**= decision threshold**<br>**Limit of detection (4σ)** | 12.5 kBq/m³ *(0.33 µCi/m³)*<br><br>25 kBq/m³ *(0.67 µCi/m³)* | 30 kBq/m³ *(0.81 µCi/m³)*<br><br>60 kBq/m³ *(1.62 µCi/m³)* |
| **Precision** | 5% of the reading ± 12.5 kBq/m³<br>*± 0.33 µCi/m³* | 5% of the reading ± 30 kBq/m³<br>*± 0.81 µCi/m³* |
| **Maximum deviation** | 12.5 kBq/m³ / year<br>*± 0.33 µCi/m³ / year* | 30 kBq/m³ / year<br>*± 0.81 µCi/m³ / year* |
| **Noise (2σ)** | ± 12.5 kBq/m³<br>*± 0.33 µCi/m³* | ± 30 kBq/m³<br>*± 0.81 µCi/m³* |
| **Response time** | < 60 sec at 90% of step | < 90 sec at 90% of step |
| **Ionization chamber(s)** | | |
| **Volume** | 660 cc | 2 x 300 cc |
| **Nominal flow** | 4 L/m | 1 L/m |
| **Ionzation voltage** | 160 VDC | |

### Operating conditions:

- Use temperature: +0°C to +40°C *(+32°F to +104°F)*
- Influence of temperature: 0.3% /°C for an ambiant temperature variation < 3°C / hour
- Humidity: from 5 to 95% rel.
- Influence of humidity: ± 1 % of the reading from 10 to 90% relative humidity
- Atmospheric pressure influence: 0.1 %/mBar, hence ± 5 % of the reading from 930 to 1030 mbar



## CALIBRATION AND RESPONSE TO TRITIUM

The tests performed in our calibration laboratory are based on the standard NF EN 60761-1 and -5. 5. The following tests can be performed upon request:

- An estimation of the limit of detection of the measurement chamber which is determined from the statistical fluctuation of the background noise level in a known environment
- The determination of the conversion coefficient (calibration factor) for tritium (Bq/m$^3$)/fA using a standardized tritium gas source
- Verification of the response with a source of standardized tritium gas
- 3 points linearity verification
- Extended 7 points linearity test
- Verification of the limit of detection at 8 points
- Estimation of the measurement response time
- Measurement of the response to a $^{133}$Ba source used as a reference for the conformity tests performed at the end of fabrication.


Example of the response at 100 kBq/m$^3$
**B IONIX 3 – MES**
Volumetric activity measured


Example of the response at 10 MBq/m$^3$
**B IONIX 3 – CMP**
Volumetric activity measured


Calibration reports available, gas calibration made upon request

Mirion Technologies (PREMIUM Analyse) gas laboratory based on the standard NF EN 60761-1 and -5

## SERVICES

Our team is also capable of proposing accessories, allowing the handling and/or the use of the B ionix portable tritium monitor easier and more user friendly.

In addition to the calibration services, we can also provide extra deliveries, such as:

- The training on use the monitors
- The maintenance of monitors
- The training on maintenance the monitors
- The qualification of the devices to specific conditions (seismic spectrum...)
- Engineering and design of custom made solutions for specific projects


## ACCESSORIES AND PART NUMBERS

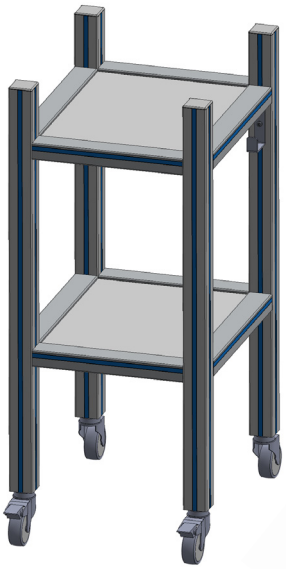
| Device reference | |
|---|---|
| Portable tritium monitor with manual gamma compensation | B IONIX 3 - MES |
| Portable tritium monitor with automatic gamma compensation | B IONIX 3 - CMP |

| Spare parts | |
|---|---|
| 12V pump for B IONIX 3 - MES | BT3 SP PPE MES |
| 12V pump for B IONIX 3 - CMP | BT3 SP PPE CMP |
| Table charger B IONIX 3 | BT3 ACC CHT |
| USB stick for data extraction | BT3 ACC USB |
| Spare battery 10.8V - 8.7Ah | BT3 ACC BAT |

| Consumables | |
|---|---|
| Epoxy filter - 0.9µ (Pack of 5) | ACC FLT 5 |
| Epoxy filter - 0.9µ (Pack of 100) | ACC FLT 100 |

| Accessories | |
|---|---|
| Fixed remote alarm beacon | ACC BAL F |
| Portable remote alarm beacon | ACC BAL P |
| Transport case | BT3 ACC CASE |
| Shoulder strap | BT3 ACC STRAP |
| Rolling table for B IONIX | BTI ACC TAB |
| Silicone hose *4x8 thickness 2mm L 5m* | BT3 ACC TUY 05 |

| Services | |
|---|---|
| Training for users | BT3 FMT USE |
| Annual maintenance flat fee | BT3 MNT ANN |



BTI ACC TAB

ACC BAL F

ACC BAL P

### CONTACT US

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SPC-179-EN-A_RMSD - 09/2021

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# C ionix™ - BXX

*Installed Tritium Monitor*


Installed tritium monitor for workplace monitoring, decommissioning, stack release or other applications.

## FEATURES

- **Performance**
  - Self-checking
  - Continuous measurement
  - Integrated light and sound alarms
  - Response time below 75 seconds
  - Detection of tritium from 10 kBq/m³ *(0.27 µCi/m³)*
  - Possibility for automatic γ compensation
- **Simple**
  - Ready to install
  - User-friendly interface
  - Transmission and alarms possible by dry contacts, Modbus Ethernet...
- **Easy maintenance**
  - Minimal intervention
  - Quick change components
  - Simple γ source verification of system

## DESCRIPTION

The C ionix monitor is used to measure continuous activity of tritium and other β emitters in gases for all applications of workplace monitoring, decommissioning, stack release or other applications.

Wall mounted, the C ionix monitor contains a complete, compact tritium monitoring channel that can be combined to a compensation channel.

The C ionix completes our range of monitors from the portable β ionix through the mobile M ionix by offering an installed solution ready to be connected in your plant.

As an option, the monitor can be used to separately and continuously measure the HTO activity of gases containing other β emitters such as noble gases. (see dedicated C ionix - HTO spec sheet).

## TECHNICAL CHARACTERISTICS

The C ionix monitors are available in several versions:
The versions below have been developed for continuous measurement of tritium activity and other β emitters in gases.

| Measurement characteristics in laboratory conditions (for tritium) | C IONIX 3 - BLC<br>Measurement with automatic gamma compensation | C IONIX 3 - BMM<br>Measurement without automatic gamma compensation | C IONIX 3 - BMC<br>Measurement with automatic gamma compensation |
|---|---|---|---|
| **Measurement range** | 10 kBq/m³ to 10 TBq/m³<br>*0.27 µCi/m³ to 270 Ci/m³* | 3.2 kBq/m³ to 3.2 TBq/m³<br>*86 nCi/m³ to 86 Ci/m³* | 3.2 kBq/m³ to 3.2 TBq/m³<br>*86 nCi/m³ to 86 Ci/m³* |
| **Limit of detection (2σ)**<br>= decision threshold<br>**Limit of detection (4σ)** | 45 kBq/m³ *(1.22 µCi/m³)*<br><br>90 kBq/m³ *(2.43 µCi/m³)* | 10 kBq/m³ *(0.27 µCi/m³)*<br><br>20 kBq/m³ *(0.54 µCi/m³)* | 15 kBq/m³ *(0.40 µCi/m³)*<br><br>30 kBq/m³ *(0.81 µCi/m³)* |
| **Precision** | 5% of the reading ± 45 kBq/m³<br>*± 1.22 µCi/m³* | 5% of the reading ± 10 kBq/m³<br>*± 0.27 µCi/m³* | 5% of the reading ± 15 kBq/m³<br>*± 0.40 µCi/m³* |
| **Maximum deviation** | 45 kBq/m³ / year<br>*1.22 µCi/m³ / year* | 10 kBq/m³ / year<br>*0.27 µCi/m³ / year* | 15 kBq/m³ / year<br>*0.40 µCi/m³ / year* |
| **Noise (2σ)** | ± 45 kBq/m³<br>*± 1.22 µCi/m³* | ± 10 kBq/m³<br>*± 0.27 µCi/m³* | ± 15 kBq/m³<br>*± 0.40 µCi/m³* |
| **Response time** | < 90 sec at 90% of scale | < 75 sec at 90% of scale | |
| **Ionization chamber(s)** | | | |
| **Volume** | 2 x 195 cc | 1 x 660 cc | 2 x 660 cc |
| **Nominal flow** | 1 L/m | 4 L/m | |
| **Ionization voltage** | 160 VDC | | |

The versions below can be used to separately and continuously measure the HTO activity of gases containing other β emitters such as noble gases:

| Measurement characteristics in laboratory conditions (for tritium) | C IONIX 3 - BLH<br>HTO measurement with automatic gamma compensation | C IONIX 3 - BMH<br>HTO measurement with automatic gamma compensation |
|---|---|---|
| **Measurement range** | 10 kBq/m³ to 10 TBq/m³<br>*0.27 µCi/m³ to 270 Ci/m³* | 3.2 kBq/m³ to 3.2 TBq/m³<br>*86 nCi/m³ to 86 Ci/m³* |
| **Limit of detection (2σ)**<br>= decision threshold<br>**Limit of detection (4σ)** | 60 kBq/m³ *(1.62 µCi/m³)*<br><br>120 kBq/m³ *(3.24 µCi/m³)* | 20 kBq/m³ *(0.54 µCi/m³)*<br><br>40 kBq/m³ *(1.08 µCi/m³)* |
| **Precision** | 5% of the reading ± 60 kBq/m³<br>*± 1.62µCi/m³* | 5% of the reading ± 20 kBq/m³<br>*± 0.54 µCi/m³* |
| **Maximum deviation** | 60 kBq/m³ / year<br>*1.62µCi/m³ / year* | 20 kBq/m³ / year<br>*0.54 µCi/m³ / year* |
| **Noise (2σ)** | ± 60 kBq/m³<br>*± 1.62µCi/m³* | ± 20 kBq/m³<br>*± 0.54 µCi/m³* |
| **Response time** | < 90 sec at 90% of scale | |
| **Ionization chamber(s)** | | |
| **Volume** | 2 x 195 cc | 2 x 660 cc |
| **Nominal flow** | 2 L/m | 8 L/m |
| **Ionization voltage** | 160 VDC | |

**Operating conditions:**

- Operating temperature: +0°C to +40°C *(+32°F to 104°F)*
- Influence of temperature: 0.3% /°C for a variation of the ambiant temperature < 3°C / hour
- Humidity: 5 to 95% rel.
- Influence of humidity: ± 1 % of the measurement from 10 to 90% of relative humidity
- Influence of atmospheric pressure: 0.1 %/mbar, hence ± 5 % of the measurement from 930 to 1030 mbar
- Protection index: IP 54

## COMMON CHARACTERISTICS

Each unit integrates a DT ionix 3 digital touch interface allowing local viewing of data through an intuitive menu:

- 4 customizable alarm thresholds
- Digital display of volumetric activity
- Archiving of 32 days of measurements
- Data extraction and system update via USB stick
- Adjustment and monitoring of the flow rate with low flow detection possible
- Graphical plotting of measurements and alarm values from 8 minutes to 8 days
- Choice of volumetric activity among 15 units, with 4 customizable ones (Bq/m³, RCA, LPCA, Sv/m³...)
- Light and sound signals when pre-alarm (orange) and alarm (red) thresholds are exceeded, as well as default operation

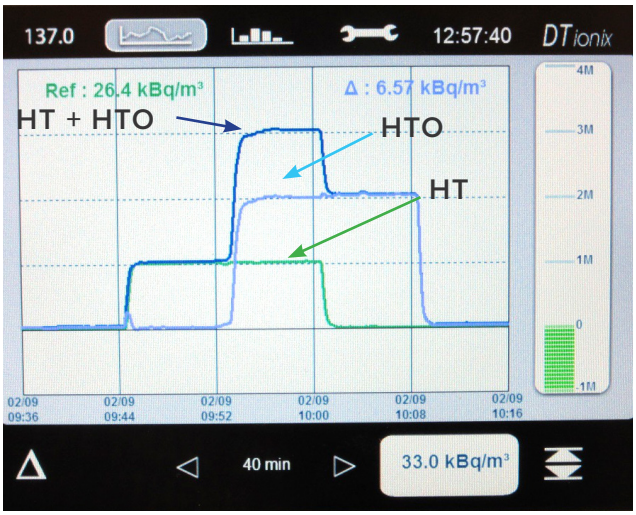

- Overall dimensions (with lights): W 475 x h 780 x d 330 mm
- Weight (max.): 36 kg *(79 lb)*
- Power supply, max. power and electrical protection:
  - Option “2”: 24 VDC, 60W, 6A fuse
  - Option “V”: 85–264 VAC, 50/60 Hz, 80W diffffferential circuit breaker 6A curve C

- Possible options:
  - Remote beacon connection
  - High leak proof (for BMM version)
  - Wall mounting on quick mounting plate
  - Measurement transmission via Modbus Ethernet (x2)
  - Gas I.O via self-sealing STAUBLI or Swagelok fittings
  - Process output with dry contact outputs, 4/20mA outputs...
  - Light and sound signals for alarms and good operation default


## TRITIUM RESPONSE EXAMPLES - VIEW FROM DT IONIX HMI


Injection of 100 kBq/m³ *(2.7 µCi/m³)* in a C IONIX 3 - BMM


Injection of 10 MBq/m³ *(270 µCi/m³)* in a C IONIX 3 - BLC




Injection of 1 MBq/m³ *(27 µCi/m³)* of tritium HT then 2 MBq/m³ *(54 µCi/m³)* of tritium HTO. The injection of HT is then stopped, and the injection of HTO is ceased thereafter.

## UNIT CONFIGURATION AND PART NUMBERS

| | Monitor configuration & options | |
|---|---|---|
| **Measurement** | | C IONIX 3 - BLC - 0 - 00 - 00 - FA - F<br>C IONIX 3 - BLH - 0 - 00 - 00 - FA - F<br>C IONIX 3 - BMM - 0 - 00 - 00 - FA - F<br>C IONIX 3 - BMC - 0 - 00 - 00 - FA - F<br>C IONIX 3 - BMH - 0 - 00 - 00 - FA - F<br>C IONIX 3 - BME - 0 - 00 - 00 - FA - F |
| **Power distribution** | 24V power supply<br>AC power supply | C IONIX 3 - BXX - 2 - XX - XX - FA - F<br>C IONIX 3 - BXX - V - XX - XX - FA - F |
| **Alarms** | Without light and sound<br>Local alarms (G / R / O + sound)<br>Remote beacon connector | C IONIX 3 - BXX - X - 0X - XX - FA - F<br>C IONIX 3 - BXX - X - YX - XX - FA - F<br>C IONIX 3 - BXX - X - XB - XX - FA - F |
| **Connections** | Process outputs (dry-contacts, 4-20mA, flow input)<br>Modbus TCP-IP | C IONIX 3 - BXX - X - XX - PX - FA - F<br>C IONIX 3 - BXX - X - XX - XM - FA - F |
| **Wall fixing** | Fixed system with STAUBLI connectors<br>Fixed system with SWAGELOK INCH connectors<br>Mobile system without wall plate (with handles & clip fixing)<br>Lock | C IONIX 3 - BXX - X - XX - XX - FA - F<br>C IONIX 3 - BXX - X - XX - XX - IA - F<br>C IONIX 3 - BXX - X - XX - XX - AA - F<br>C IONIX 3 - BXX - X - XX - XX - FA - F |
| **Version** | English<br>French | C IONIX 3 - BXX - X - XX - XX - FA - E<br>C IONIX 3 - BXX - X - XX - XX - FA - F |
| **Reference example** | C ionix monitor full option with automatic gamma compensation | C IONIX 3 - BMC - V - YB - PM - FA - F |

| Accessories | |
|---|---|
| Wall plate | ACC PLM |
| Fixed alarm beacon | CX3 ACC BAL F |
| Gas exhaust with silencer | ACC ARG SIL |
| RAC SWA 1/4RT gas exhaust + filter | ACC ARG S4F |
| Gas exhaust for 8 mm hose | ACC ARG S08 |
| Gas exhaust for 6 mm hose | ACC ARG S06 |
| Mobile frame for 1 C ionix - BXX | CX3 ACC CHM 01 |
| Mobile frame for 2 C ionix - BXX | CX3 ACC CHM 02 |
| Table frame for 1 C ionix - BXX | CX3 ACC CHM TAB |

| Spare parts | |
|---|---|
| High leak proof pump assembly | CX3 SP BTR P6000 |

| Consumables | |
|---|---|
| 24V pumps 5.5 Lpm (x1*) | CX3 SP PPE |
| IP 54 foam filter (x2*) | SP 60715 182 |
| Cabinet fan (x1*) | SP 8414N |
| DT ionix axial fan (x1*) | SP 412F |
| DT ionix axial fan mounted on support (x1*) | SP 412F P |
| 2µm PTFE filter (x1*) | CX3 SP FE 4 |

* quantity needed for annual maintenance of monitor

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# C ionix™ - HTO

*Installed Tritium Monitor*


Installed HTO activity monitor for workplace monitoring, decommissioning, stack release and other applications.

## FEATURES

- **Performance**
  - Self-checking
  - Continuous measurement
  - Automatic γ compensation
  - Integrated light and sound alarms
  - Response time from 90 seconds
  - Detection of tritium from 20 kBq/m$^3$ *(0.54 µCi/m$^3$)*
- **Simple**
  - Ready to install
  - User-friendly interface
  - Transmission and alarms possible by dry contacts, Modbus Ethernet...
- **Easy maintenance**
  - Minimal intervention
  - Quick change components
  - Simple γ source verification of system

## DESCRIPTION

The monitor C ionix is used to measure continuous activity of tritium and other β emitters in a gas for all applications of workplace monitoring, decommissioning, stack release or other applications.

The HTO version can be used to separately and continuously measure the HTO activity of gases containing other β emitters such as noble gases, as well as HTO activity in a mixed gas of HT + HTO.

Typically made for use in research facilities and PHWR, they provide a precise and reliable measurement.

Due to the SAM (Membrane Separator) no additional waste is created. Moreover, there is no need for periodical consumable replacement as the SAM is made to be durable.

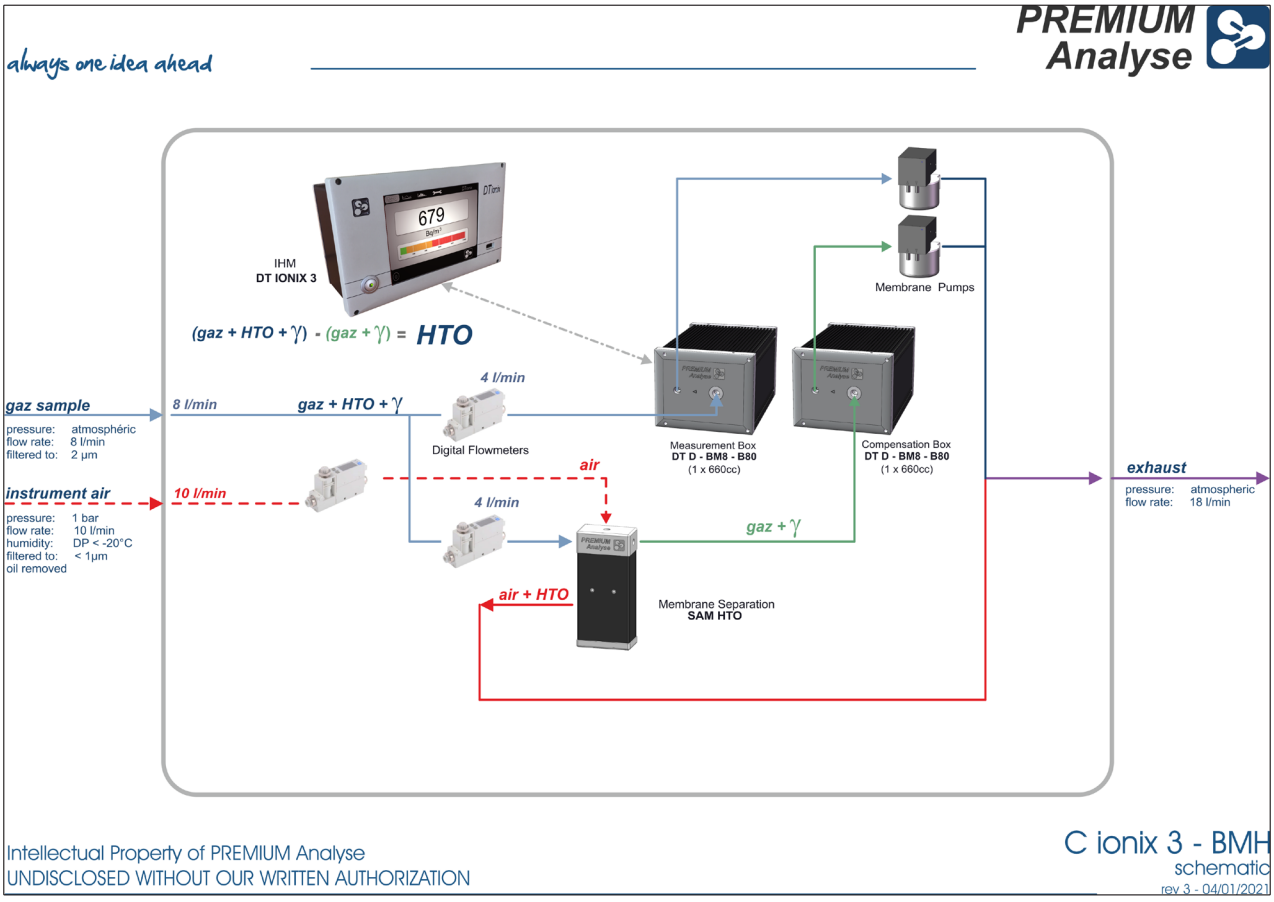
## TECHNICAL CHARACTERISTICS

The C ionix - HTO monitors are available in several versions:

| Measurement characteristics in laboratory conditions (for tritium) | C IONIX 3 - BLH<br>HTO measurement with automatic gamma compensation | C IONIX 3 - BMH<br>HTO measurement with automatic gamma compensation |
|---|---|---|
| **Measurement range** | 10 kBq/m³ to 10 TBq/m³<br>*0.27 µCi/m³ to 270 Ci/m³* | 3.2 kBq/m³ to 3.2 TBq/m³<br>*86 nCi/m³ to 86 Ci/m³* |
| **Limit of detection (2σ)**<br>= decision threshold<br>**Limit of detection (4σ)** | 60 kBq/m³ *(1.62 µCi/m³)*<br><br>120 kBq/m³ *(3.24 µCi/m³)* | 20 kBq/m³ *(0.54 µCi/m³)*<br><br>40 kBq/m³ *(1.08 µCi/m³)* |
| **Precision** | 5% of the reading ± 60 kBq/m³ *(± 1.62 µCi/m³)* | 5% of the reading ± 20 kBq/m³ *(± 0.54 µCi/m³)* |
| **Maximum deviation** | 60 kBq/m³ / year *(1.62 µCi/m³)* | 20 kBq/m³ / year *(0.54 µCi/m³)* |
| **Noise (2σ)** | ± 60 kBq/m³ *(± 1.62 µCi/m³)* | ± 20 kBq/m³ *(± 0.54 µCi/m³)* |
| **Response time** | < 90 sec at 90% of step | |
| **Ionization chamber(s)** | | |
| **Volume** | 2 x 195 cc | 2 x 660 cc |
| **Nominal flow** | 2 L/m | 8 L/m |
| **Ionization voltage** | 160 VDC | |

**Operating conditions:**

- Operating temperature: +0°C to +40°C *(+32°F to +104°F)*
- Influence of temperature: 0.3% /°C for a variation of the ambiant temperature < 3°C / hour
- Humidity: 5 to 95% rel.
- Influence of humidity: ± 1 % of the measurement from 10 to 90% of relative humidity
- Influence of atmospheric pressure: 0.1 %/mbar, hence ± 5 % of the measurement from 930 to 1030 mbar
- Protection index: IP 54



## COMMON CHARACTERISTICS

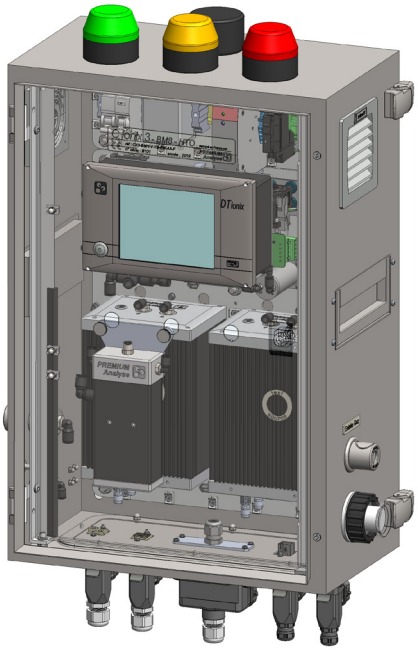

Each unit integrates a DT ionix 3 digital touch interface allowing local viewing of data through an intuitive menu:

- 4 customizable alarm thresholds
- Digital display of volumetric activity
- Archiving of 32 days of measurements
- Data extraction and system update via USB stick
- Adjustment and monitoring of the flow rate with low flow detection possible
- Graphical plotting of measurements and alarm values from 8 minutes to 8 days
- Choice of volumetric activity among 15 units, with 4 customizable ones (Bq/m³, RCA, LPCA, Sv/m³...)
- Light and sound signals when pre-alarm (orange) and alarm (red) thresholds are exceeded, as well as default operation

- Overall dimensions (with lights): W 475 x h 780 x d 330 mm
- Weight (max.): 36 kg *(79 lb)*
- Power supply, max. power and electrical protection:
  - Option “2”: 24 VDC , 60W, 6A fuse
  - Option “V”: 85–264 VAC, 50/60 Hz, 80W differential circuit 6A curve C

- Possible options:
  - Remote beacon connection
  - Wall mounting on quick mounting plate
  - Measurement transmission via Modbus Ethernet (x2)
  - Gas I.O via self-sealing STAUBLI or Swagelok fittings
  - Process output with dry contact outputs, 4/20mA outputs...
  - Light and sound signals for alarms and default operation


The membrane separation device



## SAM - MEMBRANE SEPARATION DEVICE

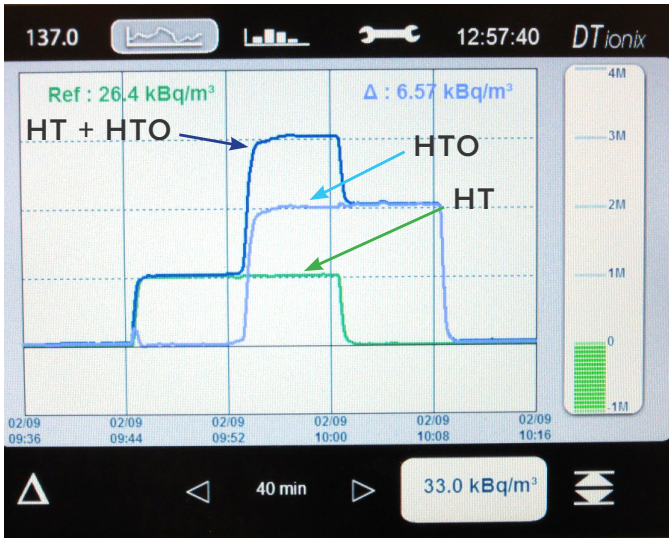
The SAM (Membrane Separator) enables the physical separation of tritium HTO from other gases.

It allows the activity measurement of tritium HTO from a mixed HT + HTO gas, as well as the activity of HTO from other noble gases.

Unlike existing products on the market, it does not require replacement nor any maintenance and does not create any contaminated waste.

Designed for continuous operation, it only requires dry instrument air to provide a precise and reliable measurement to research facilities as well as PHWR.

Integrated in the cabinet, the presence of this advanced device is transparent for the user. See the SAM HTO spec sheet for more information.




Injection of 1 MBq/m³ *(27 µCi/m³)* of tritium HT then 2 MBq/m³ *(54 µCi/m³)* of tritium HTO. The injection of HT is then stopped, and the injection of HTO is ceased thereafter.

## UNIT CONFIGURATION AND PART NUMBERS

| | Monitor configuration & options | |
|---|---|---|
| **Measurement monitor** | | C IONIX 3 - BLH - 0 - 00 - 00 - FA - F<br>C IONIX 3 - BMH - 0 - 00 - 00 - FA - F |
| **Power distribution** | 24V power supply<br>AC power supply | C IONIX 3 - BXX - 2 - XX - XX - FA - F<br>C IONIX 3 - BXX - V - XX - XX - FA - F |
| **Alarms** | Without light and sound<br>Local alarms (G / R / O + sound)<br>Remote beacon connector | C IONIX 3 - BXX - X - 0X - XX - FA - F<br>C IONIX 3 - BXX - X - YX - XX - FA - F<br>C IONIX 3 - BXX - X - XB - XX - FA - F |
| **Connections** | Process outputs (dry-contacts, 4-20mA, flow input)<br>Modbus TCP-IP | C IONIX 3 - BXX - X - XX - PX - FA - F<br>C IONIX 3 - BXX - X - XX - XM - FA - F |
| **Wall fixing** | Installed system with STAUBLI connectors<br>Installed system with SWAGELOK INCH connectors<br>Mobile system without wall plate (with handles & clip fixing)<br>Lock | C IONIX 3 - BXX - X - XX - XX - FA - F<br>C IONIX 3 - BXX - X - XX - XX - IA - F<br>C IONIX 3 - BXX - X - XX - XX - AA - F<br>C IONIX 3 - BXX - X - XX - XX - FA - F |
| **Version** | English<br>French | C IONIX 3 - BXX - X - XX - XX - FA - E<br>C IONIX 3 - BXX - X - XX - XX - FA - F |
| **Reference example** | C ionix monitor full option with automatic gamma compensation | C IONIX 3 - BMH - V - YB - PM - FA - F |

| Accessories | |
|---|---|
| Wall plate | ACC PLM |
| Fixed alarm beacon | CX3 ACC BAL F |
| Gas exhaust with silencer | ACC ARG SIL |
| RAC SWA 1/4RT gas exhaust + filter | ACC ARG S4F |
| Gas exhaust for 8 mm hose | ACC ARG S08 |
| Gas exhaust for 6 mm hose | ACC ARG S06 |
| Mobile frame for 1 C ionix - BXX | CX3 ACC CHM 01 |
| Mobile frame for 2 C ionix - BXX | CX3 ACC CHM 02 |
| Table frame for 1 C ionix - BXX | CX3 ACC CHM TAB |

| Consumables | |
|---|---|
| 24V pumps 5,5 Lpm (x1*) | CX3 SP PPE |
| IP 54 foam filter (x2*) | SP 60715 182 |
| Cabinet fan (x1*) | SP 8414N |
| DT ionix axial fan (x1*) | SP 412F |
| DT ionix axial fan mounted on support (x1*) | SP 412F P |
| 2µm PTFE filter (x1*) | CX3 SP FE 4 |

* quantity needed for annual maintenance of monitor

| Spare parts | |
|---|---|
| High leak proof pump assembly | CX3 SP BTR P6000 |

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# SAM HTO™

*Membrane Separator*

Membrane separator for physical separation of tritium HTO in all premises surveillance applications, stack monitoring or any other application.

## FEATURES

- **Simple**
  - Integrated monitors
  - No user-handling required
- **Reliable**
  - Maintenance-free
  - Continuous measurement

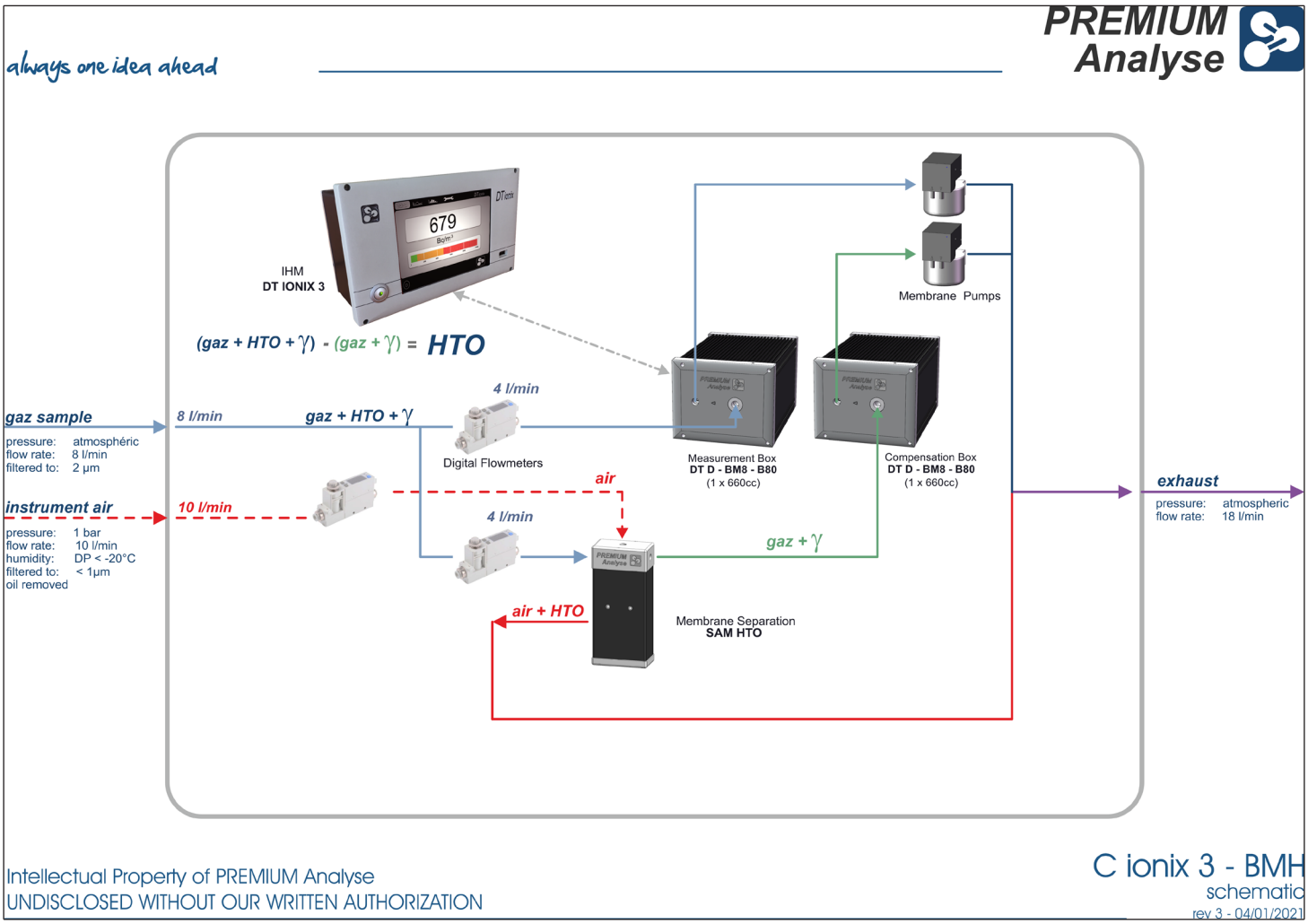
## DESCRIPTION

The SAM HTO membrane separator enables the physical separation of tritium HTO from other gases. It allows the measurement of tritium activity in the from of HTO in a mix HT + HTO, or the measurement of noble gases activity from which HTO can be removed.

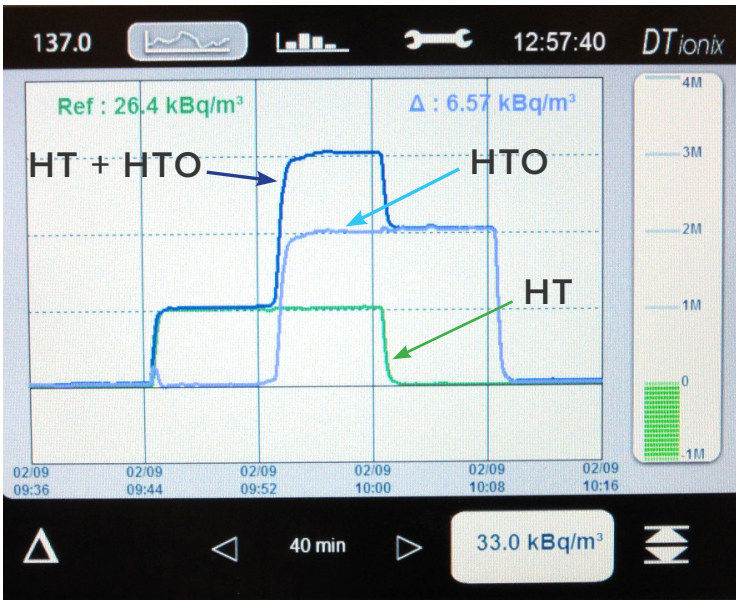
It is adapted for applications in stack surveillance as well as process monitoring.

With no need for replacement or maintenance, it does not create any waste, thus presenting a valuable alternative to currently existing solutions.

## SCHEMATIC DRAWING




Schematic drawing of a C ionix 3 - BMH for the measurement of tritium HTO




Injection of 1 MBq/m³ *(27 µCi/m³)* tritium in the form of HT, then of 2 MBq/m³ *(54 µCi/m³)* of tritium in the form of HTO. The injection of HT is stopped, then injection of HTO is stopped as well.

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# C ionix™ - GN

*Installed Noble Gas Monitor*


Installed noble gas activity monitor for workplace monitoring, decommissioning, stack release and other applications.

## FEATURES

- **Performance**
  - Self-checking
  - Continuous measurement
  - Automatic γ compensation
  - Integrated light and sound alarms
  - Response time from 90 seconds
- **Simple**
  - Ready to install
  - User-friendly interface
  - Transmission and alarms possible by dry contacts, Modbus Ethernet...
- **Easy maintenance**
  - Minimal intervention
  - Quick change components
  - Simple γ source verification of system

## DESCRIPTION

The monitor C ionix is used to measure continuous activity of tritium and other β emitters in a gas for all applications of workplace monitoring, decommissioning, stack release or other applications.

The GN version has been designed to measure continuously the noble gas β emitters activity in a mixed gas of noble gas + HTO.

Typically made for use in research facilities and PHWR, they provide a precise and reliable measurement.

Due to the SAM (Membrane Separator) no additional waste is created. Moreover, there is no need for periodical consumable replacement as the SAM is made to be durable.

The measurement performances are linked to the element chosen ($^{85}$Kr, $^{133}$Xe, $^{222}$Rn...). For more information regarding the emasurement performances, please contact us.

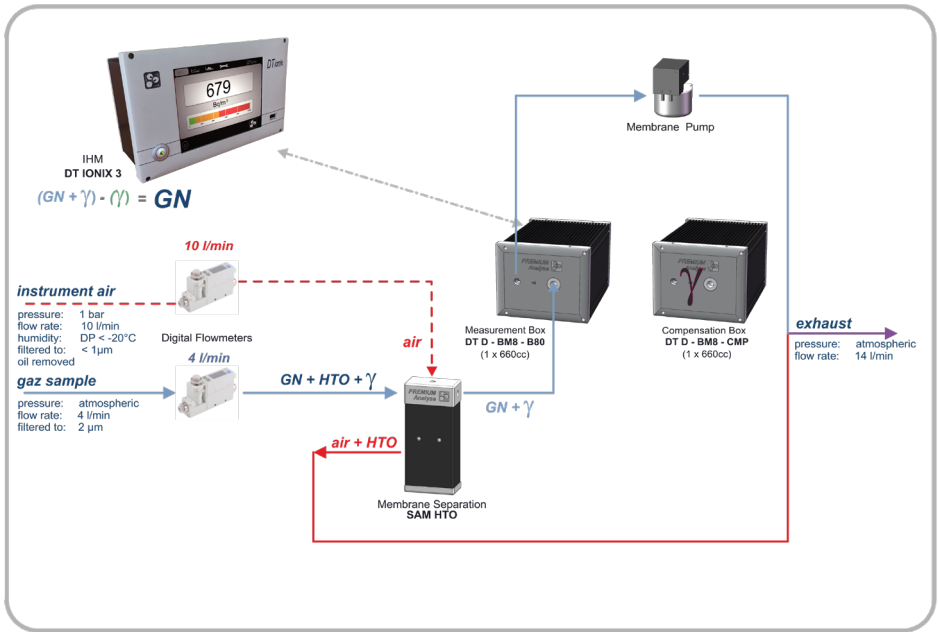
## UNIT CONFIGURATION AND PART NUMBERS

| | Monitor configuration & options | |
|---|---|---|
| **Measurement monitor** | | C IONIX 3 - BLG - 0 - 00 - 00 - FA - F<br>C IONIX 3 - BMG - 0 - 00 - 00 - FA - F |
| **Power distribution** | 24V power supply<br>AC power supply | C IONIX 3 - BXX - 2 - XX - XX - FA - F<br>C IONIX 3 - BXX - V - XX - XX - FA - F |
| **Alarms** | Without light and sound<br>Local alarms (G / R / O + sound)<br>Remote beacon connector | C IONIX 3 - BXX - X - 0X - XX - FA - F<br>C IONIX 3 - BXX - X - YX - XX - FA - F<br>C IONIX 3 - BXX - X - XB - XX - FA - F |
| **Connexions** | Process outputs (dry-contacts, 4-20mA, flow input)<br>Modbus TCP-IP | C IONIX 3 - BXX - X - XX - PX - FA - F<br>C IONIX 3 - BXX - X - XX - XM - FA - F |
| **Wall fixing** | Installed system with STAUBLI connectors<br>Installed system with SWAGELOK INCH connectors<br>Mobile system without wall plate (with handles & clip fixing)<br>Lock | C IONIX 3 - BXX - X - XX - XX - FA - F<br>C IONIX 3 - BXX - X - XX - XX - IA - F<br>C IONIX 3 - BXX - X - XX - XX - AA - F<br>C IONIX 3 - BXX - X - XX - XX - FA - F |
| **Version** | English<br>French | C IONIX 3 - BXX - X - XX - XX - FA - E<br>C IONIX 3 - BXX - X - XX - XX - FA - F |
| **Reference example** | C ionix monitor full option with automatic gamma compensation | C IONIX 3 - BMG - V - YB - PM - FA - F |

| Accessories | |
|---|---|
| Wall plate | ACC PLM |
| Fixed alarm beacon | CX3 ACC BAL F |
| Gas exhaust with silencer | ACC ARG SIL |
| RAC SWA 1/4RT gas exhaust + filter | ACC ARG S4F |
| Gas exhaust for 8 mm hose | ACC ARG S08 |
| Gas exhaust for 6 mm hose | ACC ARG S06 |
| Mobile frame for 1 C ionix - BXX | CX3 ACC CHM 01 |
| Mobile frame for 2 C ionix - BXX | CX3 ACC CHM 02 |
| Table frame for 1 C ionix - BXX | CX3 ACC CHM TAB |

| Consumables | |
|---|---|
| 24V pumps 5.5 Lpm (x1*) | CX3 SP PPE |
| IP 54 foam filter (x2*) | SP 60715 182 |
| Cabinet fan (x1*) | SP 8414N |
| DT ionix axial fan (x1*) | SP 412F |
| DT ionix axial fan mounted on support (x1*) | SP 412F P |
| 2µm PTFE filter (x1*) | CX3 SP FE 4 |

| Spare parts | |
|---|---|
| High leak tightness pump assembly | CX3 SP BTR P6000 |

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# C ionix™ - EXX

*Installed Tritium Monitor*

Installed tritium monitor for workplace monitoring, decomissioning, stack release or other applications.

## FEATURES

- **High-performance**
  - Self-checking
  - Continuous measurement
  - Response time below 3 minutes
  - Integrated light and sound alarms
  - Detection of tritium from 10 kBq/m³ *(0.27 µCi/m³)*
  - Possibility for automatic γ compensation
- **Simple**
  - Ready to install
  - User-friendly interface
  - Transmission of alarms possible by dry contacts, Modbus Ethernet...
- **Easy maintenance**
  - Minimal intervention
  - Quick change components
  - Simple γ source verification of system

## DESCRIPTION

The monitor C ionix measures continuous activity of tritium and other β emitters in gases for all applications of workplace monitoring, decomissioning, stack release or other applications.

Wall mounted, the C ionix monitor contains a complete, compact tritium monitoring channel that can be combined to a compensation channel.

The C ionix completes our range of monitors from the portable B ionix to the mobile M ionix by offering an installed solution ready to be connected in your plant.

As an option, the monitors can automatically compensate the γ environment due to a compensation detector that can be installed.

## TECHNICAL CHARACTERISTICS

The C ionx - EXX monitors are available in several versions:
The versions below have been developed for continuous measurement of tritium activity and other β emitters in gases:

| Measurement characteristics in laboratory conditions (given for tritium) | C IONIX - EXM<br>Tritium measurement with manual gamma compensation | C IONIX - EXC<br>Tritium measurement with automatic gamma compensation |
|---|---|---|
| **Measurement range** | 2 kBq/m³ to 2 GBq/m³<br>*54 nCi/m³ to 54 mCi/m³* | 2 kBq/m³ to 2 GBq/m³<br>*54 nCi/m³ to 54 mCi/m³* |
| **Limit of detection (2σ)**<br>**= decision threshold**<br>**Limit of detection (4σ)** | 10 kBq/m³ *(0.27 µCi/m³)*<br><br>20 kBq/m³ *(0.54 µCi/m³)* | 15 kBq/m³ *(0.41 µCi/m³)*<br><br>30 kBq/m³ *(0.81 µCi/m³)* |
| **Precision** | 5% of the measurement ± 10 kBq/m³<br>*± 0.27 µCi/m³* | 5% of the measurement ± 15 kBq/m³<br>*± 0.41 µCi/m³* |
| **Maximum deviation** | 10 kBq/m³ / year *(0.27 µCi/m³)* | 15 kBq/m³ / year *(0.41 µCi/m³)* |
| **Noise (2σ)** | ± 10 kBq/m³ *(± 0.27 µCi/m³)* | ± 15 kBq/m³ *(± 0.41 µCi/m³)* |
| **Response time** | < 3 mins at 90% of step | |
| **Ionization chamber(s)** | | |
| **Volume** | 4 200 cc | 2 x 4 200 cc |
| **Nominal flow** | 15 L/m | |
| **Ionization voltage** | 160 VDC | |

**Operating conditions:**

- Operating temperature: +0°C to +40°C *(+32°F to 104°F)*
- Influence of temperature: 0.3% /°C  for a variation of the ambiant temperature < 3°C / hour
- Humidity: 5 to 95% rel.
- Influence of humidity: ± 1 % of the measurement from 10 to 90% of relative humidity
- Influence of atmospheric pressure: 0.1 %/mbar, hence ± 5 % of the measurement from 930 to 1030 mbar
- Protection index: IP 54

## COMMON CHARACTERISTICS

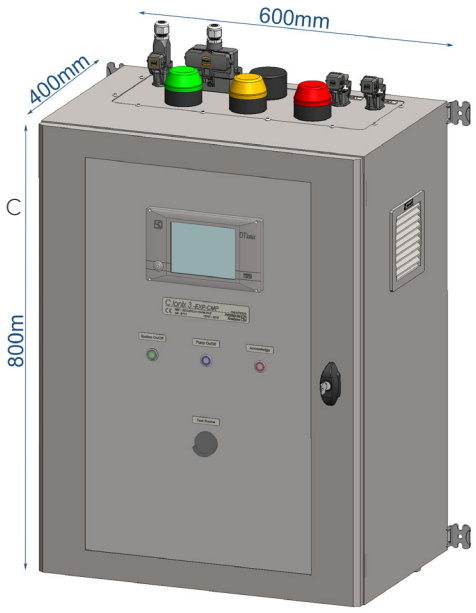
Each unit integrates a DT ionix 3 digital touch interface allowing local viewing of data through an intuitive menu:

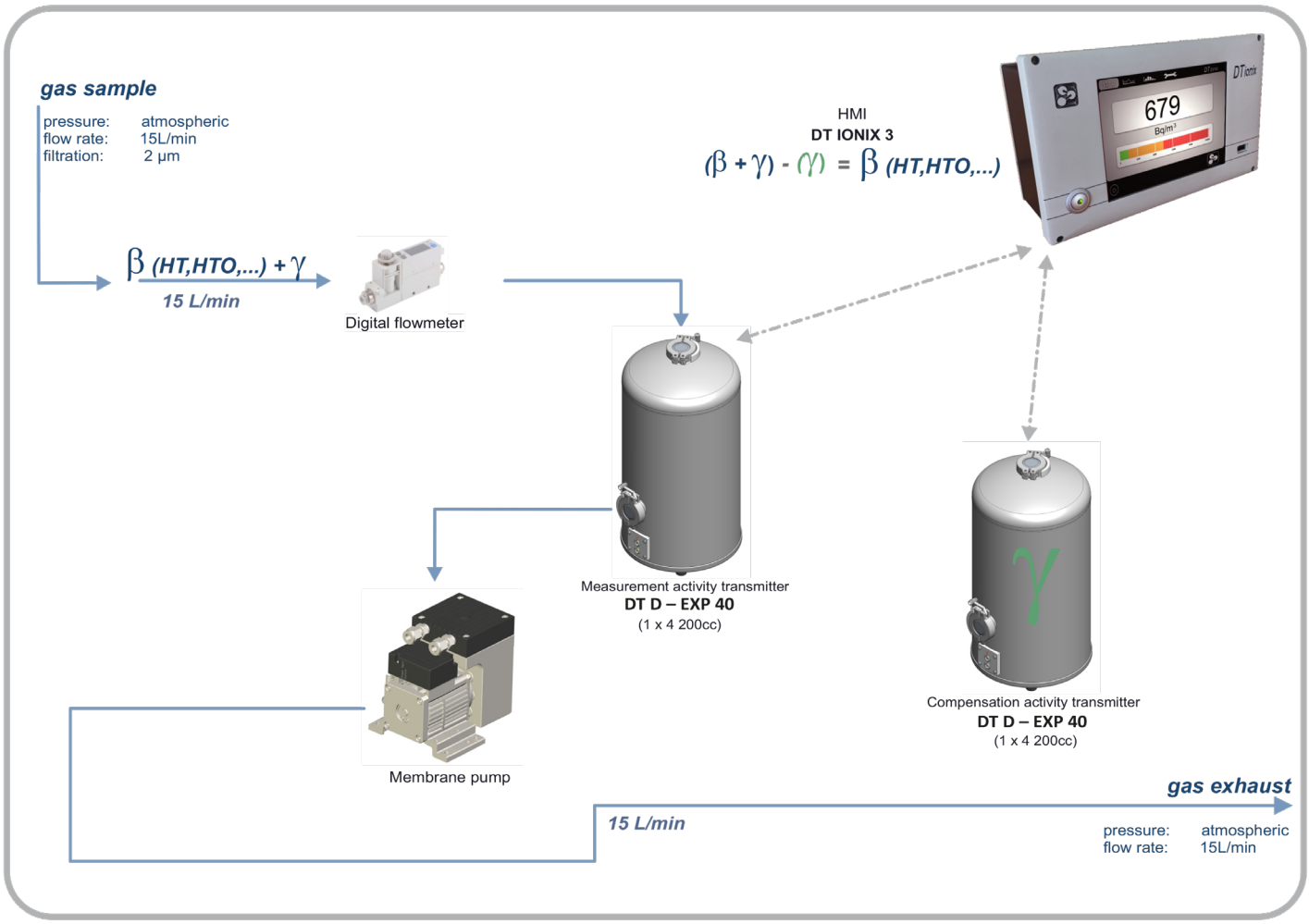
- 4 customizable alarm thresholds
- Digital display of volumetric activity
- Archiving of 32 days of measurements
- Data extraction and system update via USB stick
- Adjustment and monitoring of the flow rate with low flow detection possible
- Graphical plotting of measurements and alarm values from 8 minutes to 8 days
- Choice of volumetric activity among 15 units, with 4 customizable ones (Bq/m³, RCA, LPCA, Sv/m³...)
- Light and sound signals when pre-alarm (orange) and alarm (red) thresholds are exceeded, as well as default operation

## POSSIBLE CONFIGURATIONS

- Overall dimensions (with lights): W 600 x H 800 x d 400 mm
- Weight (max.): 80 kg *(176 lb)*
- Power supply, max. power and electrical protection:
  - Option “2”: 24 VDC , 120W, 6A fuse
  - Option “V”: 85–264 VAC, 50/60 Hz, 120W differential circuit breaker 6A curve C

- Possible options:
  - Remote beacon connection
  - High leak proof (for BMM version)
  - Wall mounting on quick mounting plate
  - Measurement transmission via Modbus Ethernet (x2)
  - Gas I.O via self-sealing STAUBLI or Swagelok fittings
  - Process output with dry contact outputs, 4/20mA outputs...
  - Light and sound signals for alarms and good operation default




**Fluid schematic for a C IONIX 3 - EXC**

## UNIT CONFIGURATION AND PART NUMBERS

| | Monitor configuration & options | |
|---|---|---|
| **Measurement** | Manual gamma compensation<br>Automatic gamma compensation | C IONIX - EXM - 0 - 00 - 00 - FA - F<br>C IONIX - EXC - 0 - 00 - 00 - FA - F |
| **Power distribution** | 24V power supply<br>AC power supply | C IONIX - EXX - 2 - XX - XX - FA - F<br>C IONIX - EXX - V - XX - XX - FA - F |
| **Alarms** | Without light and sound<br>Local alarms (G / O / R + sound)<br>Remote beacon connector | C IONIX - EXX - X - 0X - XX - FA - F<br>C IONIX - EXX - X - YX - XX - FA - F<br>C IONIX - EXX - X - XB - XX - FA - F |
| **Connections** | Process outputs (dry-contacts, 4-20mA, flow input)<br>Modbus TCP-IP | C IONIX - EXX - X - XX - PX - FA - F<br>C IONIX - EXX - X - XX - XM - FA - F |
| **Label** | English<br>French | C IONIX - EXX - X - XX - XX - FA - E<br>C IONIX - EXX - X - XX - XX - FA - F |
| **Reference example** | C ionix monitor full option with automatic gamma compensation | C IONIX - EXC - V - YB - PM - FA - F |

| Accessories | |
|---|---|
| 2µ anti-dust filter + Staubli | ACC F2T S |
| 2µ anti-dust filter + Silencer | ACC F2T |
| Installed alarm beacon | CX3 ACC BAL F |
| Gas connector with silencer | ACC ARG SIL |
| Gas connector for 8 mm hose | ACC ARG S08 |
| Mobile support 1 C ionix - EXX | CEX3 ACC CHM 01 |

| Consumables | |
|---|---|
| Maintenance kit for pump (*1/2) | SP KIT N838 |
| Spare pump (*1/2) | CEX3 SP PPE |
| DT ionix axial fan (x1*) | SP 412F |
| DT ionix axial fan mounted on support (x1*) | SP 412F P |
| Cabinet fan (x1*) | SP 4314 |
| IP55 filter (*2) | SP 60715 187 |
| HEPA filter (*1) | SP CFL THE |
| 2µ filter (*1) | SP 90F0002 |
| O-ring (*1) | SP 90F0040 |
| Flat seal (*1) | SP 90F0048 |

* quantity needed for annual maintenance of monitor

C IONIX 3 - EXC - V - YB - PM - FA - F

### CONTACT US

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SPC-58-EN-A_RMSD - 09/2021

MIRION TECHNOLOGIES

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PREMIUM ANALYSE

# M ionix™

*Mobile Tritium Detector*


Mobile tritium detector for radioprotection, process control, environment monitoring, laboratory, decommissioning.

## FEATURES

- **High-performance**
  - Self-checking
  - Continuous measurement
  - Response time under 3 min
  - Integrated light and sound alarms
  - Capability for automatic γ compensation
  - Detection of tritium from 10 kBq/m³ *(0.27 µCi/m³)*
- **Easy to use**
  - Ready to install
  - Minimal intervention
  - User-friendly interface
- **Mobile**
  - Lifting rings
  - Carrying handles
  - Rugged aluminum casing
  - Easily movable on various surfaces

## DESCRIPTION

The mobile tritium detector M ionix is used for continuous measurement of tritium levels and other β emitter gases in ambient air.

Due to its very good sensibility, its user-friendliness and its reliability, the M ionix mobile detector ensures the radioprotection of your teams and premises, during construction, dismantling or as a temporary replacement of a fixed monitor.

The M ionix benefits from the most advanced technologies developed by Mirion Technologies (PREMIUM Analyse):

- HEPA filtration system,
- DT ionix 3 interface with digital touchscreen,
- Beta activity transmitter EXP40 with low noise preamplifier

Ready to use, the M ionix mobile detectors offer advanced functionalities such as: graphical plotting of data, data archiving, alarm carryover, data extraction via USB stick...

## TECHNICAL CHARACTERISTICS

The mobile M ionix monitors are available in several versions:
The versions below are intented for continuous measurement of tritium activity and other β emitters in gases:

| Measurement characteristics in laboratory conditions (for tritium) | **M IONIX 2 - XQS**<br>**Tritium measurement with manual gamma compensation** | **M IONIX 2 - XCS**<br>**Tritium measurement with automatic gamma compensation** |
|---|---|---|
| **Measurement range** | 2.1 kBq/m³ to 2.1 GBq/m³<br>*54 nCi/m³ to 54 Ci/m³* | 2.1 kBq/m³ to 2.1 GBq/m³<br>*54 nCi/m³ to 54 Ci/m³* |
| **Limit of detection (2σ)**<br>**= decision threshold**<br>**Limit of detection (4σ)** | 10 kBq/m³ *(0.27 µCi/m³)*<br><br>20 kBq/m³ *(0.54 µCi/m³)* | 15 kBq/m³ *(0.41 µCi/m³)*<br><br>30 kBq/m³ *(0.82 µCi/m³)* |
| **Precision** | 5% of the measurement ± 10 kBq/m³<br>*± 0.27 µCi/m³* | 5% of the measurement ± 15 kBq/m³<br>*± 0.41 µCi/m³* |
| **Maximum deviation** | 10 kBq/m³ / year<br>*0.27 µCi/m³ / year* | 15 kBq/m³ / year<br>*0.41 µCi/m³ / year* |
| **Noise (2σ)** | ± 10 kBq/m³<br>*± 0.27 µCi/m³* | ± 15 kBq/m³<br>*± 0.41 µCi/m³* |
| **Response time** | < 3 min at 90% of step | |
| **Ionization chamber(s)** | | |
| **Volume** | 4 200 cc | 2 x 4 200 cc |
| **Nominal flow** | 15 L/m | 15 L/m |
| **Ionization voltage** | 160 VDC | |

**Operating conditions:**

- Use temperature: +0°C to +40°C *(+32°F to +104°F)*
- Influence of temperature: 0.3% /°C  for an ambiant temperature < 3°C / hour
- Humidity: from 5 to 95% rel.
- Influence of humidity: ± 1 %  of the measurement from 10 to 90% relative humidity
- Atmospheric pressure influence: 0.1%/mbar, hence ± 5% of the measurement from 930 to 1030 mbar

## COMMON CHARACTERISTICS

Each unit integrates a DT ionix 3 digital touch interface allowing local viewing of data through an intuitive menu:

- 4 customizable alarm thresholds
- Digital display of volumetric activity
- Archiving of 32 days of measurement
- Data extraction and software update via USB
- Adjustment and monitoring of the flow rate with low flow detection possible
- Graphical plotting of measurements and alarm values from 8 minutes to 8 days
- Choice of volumetric activity among 15 units, with 4 customizable ones (Bq/m³, RCA, LPCA, Sv/m³...)
- Light and sound signals when pre-alarm (orange) and alarm (red) thresholds are exceeded, as well as default operation

## POSSIBLE CONFIGURATIONS

- Global characteristics:
  - Dimensions (with lights): W 600 x H 1000 x d 500 mm
  - Weight (approx.): 70 kg
  - Network: Ethernet Modbus connection via RJ45 connector
  - Alarms: 2 alarm outputs (24V / 80mA per signal)

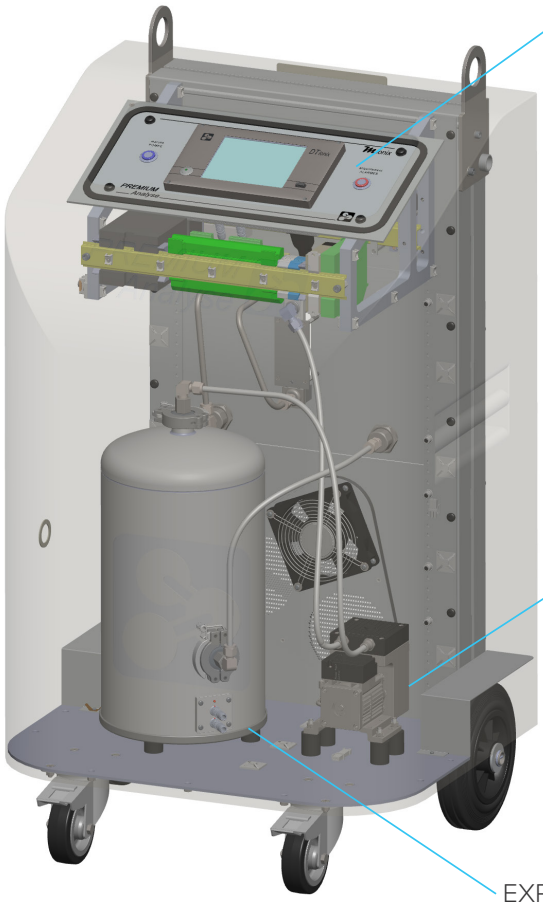
- Electrical characteristics:
  - Power supply: 85 - 264VAC, 50/60Hz
  - Max power: 120W
  - Electrical protection: 6A differential breaker with C curve

- Optional features:
  - Remote alarm beacon
  - Gas I/O via self-sealing Staubli connectors
  - Process output with dry-contacts, 4/20mA outputs...
  - Light and sound alarms

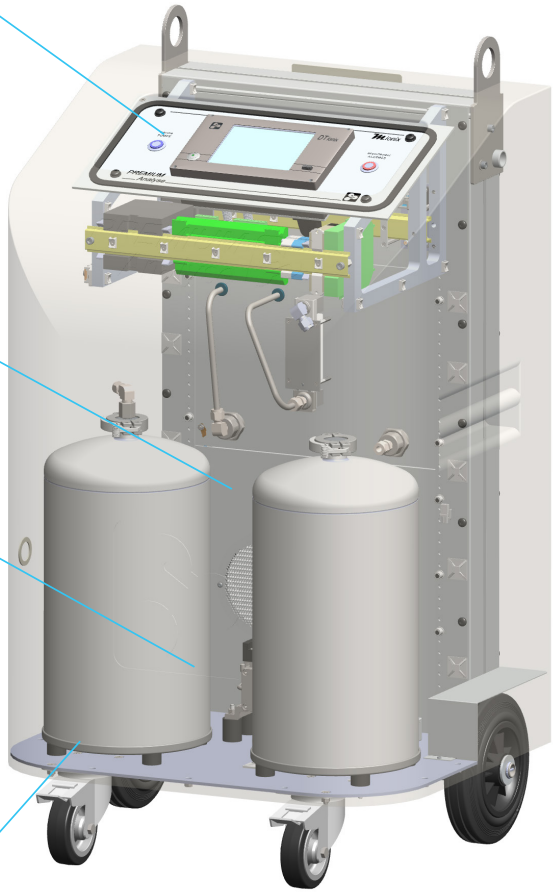
- Filtration:
  - "FXS": 20µ anti-dust filtration
  - "TXS": V.H.E HEPA filtration

- Measurement:
  - "XQS": With flowmeter and simple measurement
  - "XCS": With flowmeter and compensation chamber for automatic γ compensation


**TXS Version**




**XQS Version**

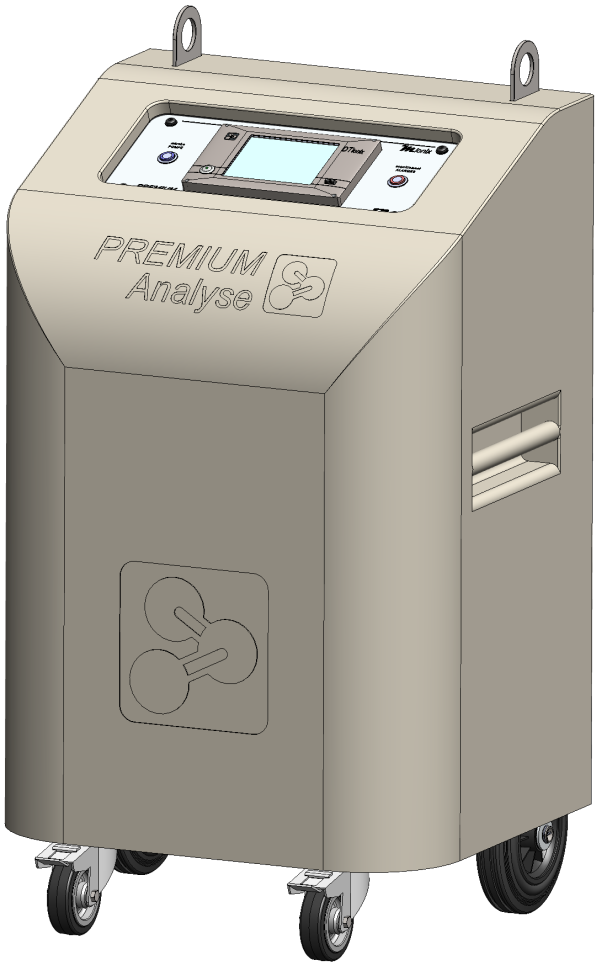



**XCS Version**

## MONITOR CONFIGURATION AND PART NUMBERS

| | Monitor configuration & options | |
|---|---|---|
| **Measurement** | | M IONIX 2 - XQS<br>M IONIX 2 - XCS |
| **Filtration** | Anti-dust filter<br>HEPA filter | M IONIX 2 - FXS<br>M IONIX 2 - TXS |
| **Measurement type** | With flowmeter and direct measurement<br>With flowmeter and compensation chamber | M IONIX 2 - XQS<br>M IONIX 2 - XCS |
| **Reference example** | M ionix mobile tritium monitor with anti-dust filtration, pump, integrated flowmeter and compensatoin chamber | M IONIX 2 - FCS |

| Accessories | |
|---|---|
| Portable alarm beacon | ACC BAL P |
| Gas connector for 8 mm hose | ACC ARG S08 |
| 5 m sampling hose | MIX ACC TUY 05 S |
| 10 m sampling hose | MIX ACC TUY 10 S |




| Consumables | |
|---|---|
| M ionix TGN micropump | MIX SP NMP 850 |
| M ionix 2 pump | MX2 SP N838 |
| Maintenance kit for M ionix 2 pump | SP KIT N838 |
| Filtering unit 0.1 µ | SP 90F2005 |
| Ceramic filtering unit 20 µ | SP 90F0007 |
| Teflon filtering unit 2 µ | SP 90F0002 |
| Viton o-ring type 26 | SP 90F0040 |
| Vlton o-ring type 36/44 FS/ FSS | SP 90F0048 |
| VHE filtering unit | SP CFL THE |
| Ventilation filter | SP CFL D120 |
| DT ionix axial fan | SP 412F |
| DT ionix axial fan mounted on support | SP 412F P |
| Case fan | SP 4314 |

### CONTACT US

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SPC-69-EN-B_RMSD - 09/2021

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# DT ionix 3™

*Human-Machine Interface*


Human-Machine Interface integrated to all of tritium detection channels manufactured by Mirion Technologies (Premium Analyse), either mobile, installed or custom.

## FEATURES

- **User-friendly**
  - Intuitive design
  - Colour touchscreen
  - Graphic and numerical display
- **Advanced features**
  - Real-time volumetric activity display
  - Remote data reading and device monitoring via Modbus
  - Data saved on internal memory, can be copied onto USB
- **Connected**
  - Modbus TCP/IP connection
  - 4/20mA analogue outputs
  - 5 dry-contact outputs with customizable alarm thresholds
  - 32 days of data acquisition and export of data via USB

## DESCRIPTION

The DT ionix 3 Human-Machine Interface has been designed to handle, manage and analyze digital signals from all of our tritium detectors.

The DT ionix 3 allows for aquisition, digitalization and display of information and data from one or two preamplifier(s).

Due to several 4-20mA analogue inputs and outputs, dry-contacts, relays and 2 Modbus outputs, it can handle all of the signals and carry them over, as well as measurement signals, to a supervision.

## CHARACTERISTICS

- Weight : 1.8 kg
- Dimensions : 9½" drawer (213 mm) x 3U (128.42 mm) x 81 mm
- Power supply : 9 to 36Vdc – 30W
- Mains connector : 110/220V – 50/60Hz – 12VDc – 180W (supplied)
- Humidity : from 5 to 95% rel.
- Temperature of use : from -10 to +40°C *(14 to 104 °F)*
- Axial fan, 8 m³/h, easily replacable

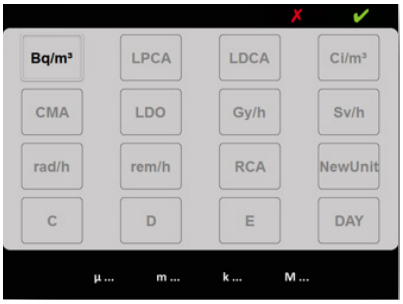

## FEATURES

- 4 customizable alarm thresholds
- Digital display of volumetric activity
- Colour touchscreen with intuitive menus
- 32 days of measurement data archived in spreadsheet format
- Data extraction and system update via USB
- Display of volumetric activity with bar chart showing alarm thresholds
- Possibility for manual offset for gamma compensation and external influences
- Graphic plotting of measurements and alarm values from 8 minutes to 8 days
- Adjustment and monitoring of the flow rate with capability to detect low flow
- Capacibility for differential measurement (with reference or gamma compensation detector)
- Choice of volumetric activity among 15 units, with 4 customizable ones (Bq/m³, RCA, LPCA, Sv/m³...)
- Light and sound signals when pre-alarm (orange) and alarm (red) thresholds are exceeded, as well as default operation
- Histogram of integrated activities, on 1h, 1 day, 1 month taking the flow in consideration, trigerred locally of from the supervision
- Configuration, visualization of state and testing detector, alarms, inputs/outputs etc via Modbus protocol (2 independent connections)

*Delivered with certificate of conformity and user manual*

## INPUTS/OUTPUTS

- Connection for 1 or 2 high resolution preamplifier (power supply and communication)
- 4 alarm relay contacts NF 1A - 24 V customizable
- 1 state relay contact NF 1A - 24 V
- 2 x 4-20mA analogue inputs customizable
- 2 x 4-20mA analogue outputs customizable
- 4 dry-contact digital inputs
- 5 dry-contact digital outputs (Green, Orange, Red, Sound, On/Off pump)
- 4 output signals 24V/100mA for the managmenet of G/Y/R and sound alarms
- 2 pump control outputs
- Data extraction via front panel USB port
- 2 Modbus / TCP-IP Ethernet connections



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SPC-61-EN-A_RMSD - 09/2021

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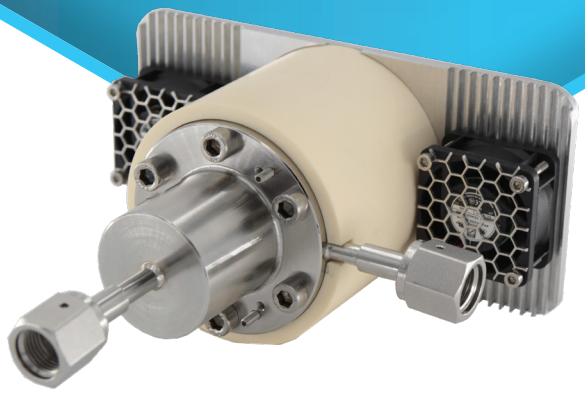
# DT D - MC10™

*10 cc Tritium Detector*



Ionization chamber for the measurement of high tritium activities in research applications, laboratories and process monitoring.
Due to its heating resistance, the detector can easily be decontaminated.

## FEATURES

- **High-performance**
  - Continuous measurement
  - Wide measurement range
  - Response time under 90 seconds
- **Simple**
  - Easy maintenance
  - Quick and easy set up
- **Reliable**
  - Decontaminable
  - Precise and stable

## DESCRIPTION

The DT D - MC10 is a small size ionization chamber (10 cc) detector allowing the measurement of high tritium activity in gases from 190 kBq/m$^3$ *(5.13 µCi/m$^3$)* to 19 PBq/m$^3$ *(513 kCi/m$^3$)*.

This detector has been designed for civil and military research applications and process monitoring, as well as specific projects such such as ITER where measurement of high activities is needed.

Due to its heating resistance, the detector can be easily decontaminated.

*Device manufactured under exploitation licence for CEA patent - L26218*
*Device resgistered as dual-use n°1B231 regulation (CE) 428/2009 Appendix IV*

# DT D - MC10 | 10 CC TRITIUM DETECTOR

## GENERAL CHARACTERISTICS

| | |
|---|---|
| • Dimensions (with dissipator) | 200 x 80 x 200 mm (w x h x d) |
| • Weight (with dissipator and ceramic) | 1 800 g |
| • Power supply | 9-36VDC, 300mA |
| • Power supply connection on preamp | LEMO EXG-1B-302-HLN |
| • CAN connection on preamp | LEMO EXG-1B-304-HLN |
| • Gas connection | SWA 1/4'' VCR connector |
| • Radon compensation | dynamic with digital filtration |
| Delivered with certificate of conformity | |

## IONIZATION CHAMBER

| | |
|---|---|
| • Material | 316L stainless steel electropolished |
| • Volume | 9.28 cc |
| • Circulation chamber | 48 cc |
| • Nominal flow rate | 250 cc/min |
| • Response coefficient | 4 734 000 (Bq/m³)/fA |
| • Ionization voltage | 160 VDC |

## HEATING RESISTANCE

- Heating resistance: 220V - 400 W - 2.2 x 4.2mm
- Power supply: 220V / 50Hz on IEC baseplate C14 type with integrated mains filter, protected against short-circuits by 2 2A 5x20mm fuses
- Thermocouple connector: female panel baseplate for type J thermocouple on regulator. Delivered with additional male plug and female baseplate for extension cable
- Heating resistance connector: 3 pins Ampenol baseplate. Delivered with additional male plug and female baseplate for extension cable
- Ventilator power supply on dissipator: 24V by ACC ALIM 24V E

## OPERATING CONDITIONS

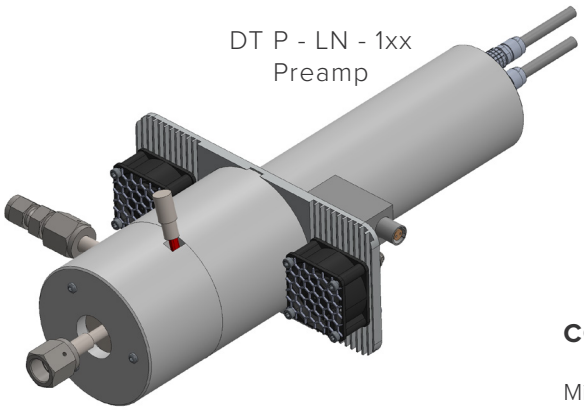
- Temperature of use: +0°C to +40°C *(+32°F to 104°F)*
- Influence of temperature: 0.3% /°C for a variation of ambiant temperature <3°C / hour
- Humidity: working with dry carrying gas
- Influence of atmospheric pressure: 0.1 %/mbar, hence ± 5 % of the measurement from 930 to 1030 mbar
- Temperature of decontamination: up to 500°C continuously

## PERFORMANCES (For tritium)

| Preamp associated | DT P - LN - 1B8 | DT P - LN - 1A7 | DT P - LN - 196 |
|---|---|---|---|
| **Measurement range** | 190 kBq/m³ to 190 TBq/m³<br>*5.13 µCi/m³ to 5.13 kCi/m³* | 1.9 MBq/m³ to 1.9 PBq/m³<br>*51.3 µCi/m³ to 51.3 kCi/m³* | 19 MBq/m³ to 19 PBq/m³<br>*513 µCi/m³ to 513 kCi/m³* |
| **Limit of detection** (2σ)<br>= decision threshold | 1 MBq/m³<br>*27 µCi/m³* | 3 MBq/m³<br>*81 µCi/m³* | 20 MBq/m³<br>*540 µCi/m³* |
| **Limit of detection** (4σ) | 2 MBq/m³<br>*54 µCi/m³* | 6 MBq/m³<br>*162 µCi/m³* | 40 MBq/m³<br>*1.08 mCi/m³* |
| **Precision** | 5% of measurement ± 1 MBq/m³<br>*± 27 µCi/m³* | 5% of measurement ± 3 MBq/m³<br>*± 81 µCi/m³* | 5% of measurement ± 20 MBq/m³<br>*± 540 µCi/m³* |
| **Maximum deviation** | 1 MBq/m³<br>*27 µCi/m³* | 3 MBq/m³<br>*81 µCi/m³* | 20 MBq/m³<br>*540 µCi/m³* |
| **Noise** (2σ) | 1 MBq/m³<br>*27 µCi/m³* | 3 MBq/m³<br>*81 µCi/m³* | 20 MBq/m³<br>*540 µCi/m³* |
| **Response time** | < 90 sec for 90% of step | | |

## INTEGRATION OF THE MEASUREMENT CHANNEL DETECTOR

DT P - LN - 1xx
Preamp



DT D - MC10

ACC BRT
Thermal regulation box



DT IONIX 3
HMI Interface

## CONTACT US

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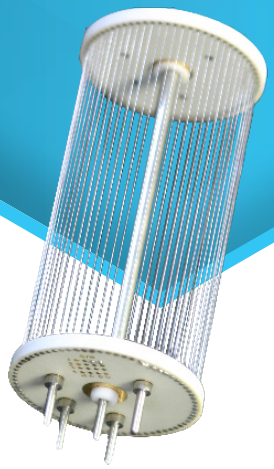
# DT D - MLB™

*Tritium Detector*



Ionization chamber for the detection and measurement of high activities for research application in laboratories and for the control of gloveboxes ambiance.

## FEATURES

- **High-performance**
  - Continuous measurement
  - Wide measurement range
  - Response time under 60 seconds
- **Simple**
  - Easy maintenance
  - Quick and easy set up
- **Reliable**
  - Precise and stable

## DESCRIPTION

The DT D - MLB detector is a small size ionization chamber (100cc) allowing the measurement of high tritium activities in gases from 21 kBq/m$^3$ *(0.57 µCi/m$^3$)* to 2.1 PBq/m$^3$ *(56.7 kCi/m$^3$)*.

This detector has been designed for civil and military research applications, as well as specific projects such as ITER, needing measurement of high activities.

Because of the way it is built and designed, this detector is particularly not sensible to the marking effect, making it one of the best possible choice for the measurement of important activities.

Thanks to a mounting on a leak-tight feedthroughs, it can be installed on gloveboxe outlet. It does not necessarily require an additional pump as it is usually mounted directly in the gas flow to be analyzed.

*Device manufactured under exploitation licence for CEA patent - L26218*
*Device resgistered as dual-use n°1B231 regulation (CE) 428/2009 Appendix IV*

# DT D - MLB | TRITIUM DETECTOR

## GENERAL CHARCTERISTICS

- Dimensions — Ø 43 x 100 mm
- Weight — 30 g
- Power-supply — 9-36VDC, 300mA
- Radon compensation — dynamic by digital filtration

Delivered with certificate of conformity

## IONIZATION CHAMBER

- Materials — 316L stainless steel - ceramic - Teflon
- Ionization volume — 100 cc
- Circulation volume — 380 cc (MLB ACC CC2)
- Nominal flow rate — 2 500 cc/min
- Response coefficient — 532 000(Bq/m³)/fA
- Tension d'ionisation — 160 VDC

## MOUNTING

- Mounting on leak-tight feedthroughs:
  - Flanged (ref: DT PE - B160L / DT PE - B180L)
  - Adjustable (ref: DT PE - BTE)
  - Straight (ref: DT PE - BTD)
- Integration in circulation chamber:
  - 380cc (ref: MLB ACC CC2)
  - 785cc (ref: ACC CCG 800)

## OPERATING CONDITIONS

- Temperature of use: 0 to 40°C *(32 to 104°F)*
- Influence of temperature: 0.3% /°C for a variation of ambiant temperature < 3°C / hour
- Humidity: from 5 to 95% rel.
- Influence of humidity: ± 1 % of measurement from 10 to 90% relative humidity
- Influence of atmospheric pressure: 0.1 %/mbar, hence ± 5 % of the measurement from 930 to 1030 mbar

## PERFORMANCES (For tritium)

| Preamp associated | DT P - LN - 1B8 | DT P - LN - 1A7 | DT P - LN - 196 |
|---|---|---|---|
| **Measurement range** | 21 kBq/m³ to 21 TBq/m³<br>*0.57 µCi/m³ to 567 Ci/m³* | 210 kBq/m³ to 210 TBq/m³<br>*5.67 µCi/m³ to 5.67 kCi/m³* | 2.1 MBq/m³ to 2.1 PBq/m³<br>*56.7 µCi/m³ to 56.7 kCi/m³* |
| **Limitof detection** (2σ)<br>= decision threshold | 125 kBq/m³<br>*3.38 µCi/m³* | 250 kBq/m³<br>*6.76 µCi/m³* | 1 MBq/m³<br>*27 µCi/m³* |
| **Limit of detection** (4σ) | 250 kBq/m³<br>*6.76 µCi/m³* | 500 kBq/m³<br>*13.51 µCi/m³* | 3 MBq/m³<br>*81 µCi/m³* |
| **Precision** | 5% of measurement ± 125 kBq/m³<br>*± 3.38 µCi/m³* | 5% of measurement ± 250 kBq/m³<br>*± 6.76 µCi/m³* | 5% of measurement ± 1 MBq/m³<br>*± 27 µCi/m³* |
| **Maximum deviation** | 125 kBq/m³<br>*3.38 µCi/m³* | 250 kBq/m³<br>*6.76 µCi/m³* | 1 MBq/m³<br>*27 µCi/m³* |
| **Noise** (2σ) | 125 kBq/m³<br>*3.38 µCi/m³* | 250 kBq/m³<br>*6.76 µCi/m³* | 1 MBq/m³<br>*27 µCi/m³* |
| **Response time** | < 60 sec for 90% of step | | |

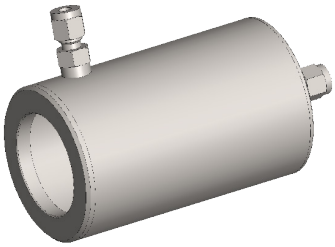
## INTEGRATION OF DETECTOR IN MEASUREMENT CHANNEL


DT IONIX 3
HMI Interface

DT PE - B160L
Leak-tight feedthrough

DT D - MLB

MLB ACC CC2
Circulation chamber





DT P - LN - 1xx
Preamp

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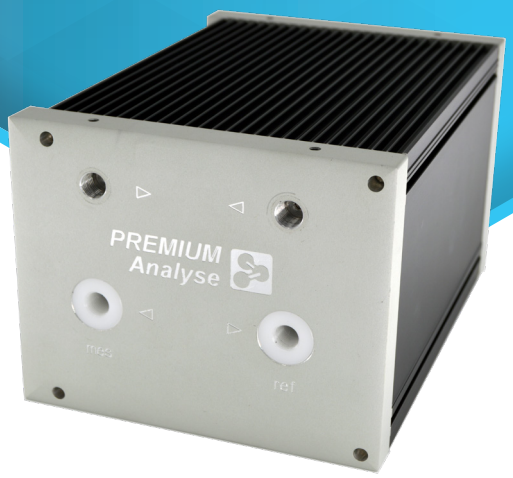
# DT D - BL2™

*195 cc Tritium Detector*




Ionization chamber for use in the field or radioprotection, environmental monitoring and process surveillance.

## FEATURES

- **High performance**
  - Continuous measurement
  - Wide measurement range
  - Response time under 90 seconds
- **Simple**
  - Maintenance-free
  - Quick and easy commissioning
- **Reliable**
  - Precise and stable

## DESCRIPTION

The DT D - BL2 is a medium size ionization chamber (195 cc) detector providing a wide measurement range from 10 kBq/m$^3$ *(270 nCi/m$^3$)* to 10 TBq/m$^3$ *(270 Ci/m$^3$)*.

This robustly-housed detector is adapted for the measurement of all ranges of activity.

The detector can be connected to a DT ionix 3 touchscreen Human Machine Interface that can be installed several hundred meters away from the detector, it benefits from the most advanced features such as data extraction via USB, Modbus communication dry contact outputs...

# DT D - BL2 | 195 CC TRITIUM DETECTOR

## GENERAL CHARACTERISTICS

- Dimensions 140 x 111 x 197 mm (w x h x d)
- Power supply 9-36VDC, 300mA
- Power supply connector baseplate LEMO ENB. 1B.304.CLL
- CAN Connector baseplate LEMO ENG. 1B.304.CLL
- Radon compensation dynamic with digital filtration

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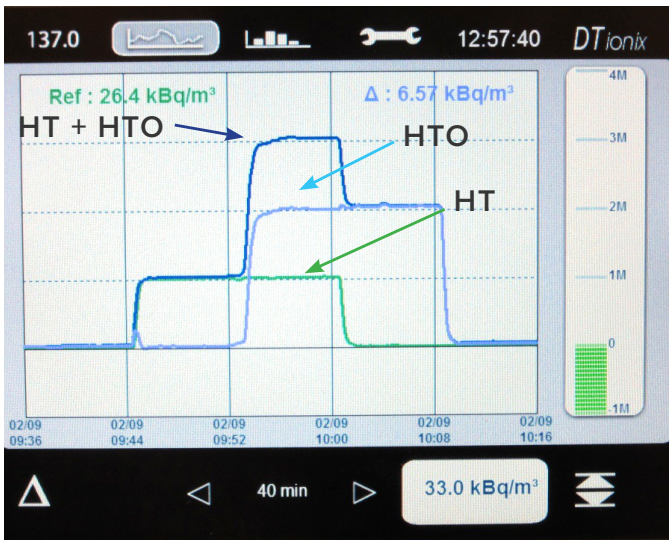
## IONIZATION CHAMBER

- Material 304L stainless steel electropolished
- Volume 195 cc
- Nominal flow 1 L/min
- Response coefficient 152 000 (Bq/m³)/fA
- Ionization voltage 160 VDC


## OPERATING CONDITIONS

- Temperature of use: +0°C to +40°C *(+32°F to +104°F)*
- Influence of temperature: 0.3% /°C for a variation of ambiant temperature < 3°C / hour
- Humidity: from 5 to 95% relative
- Influence of humidity: ± 1 % of the measurement from 10 to 90% relative humidity
- Influence of atmospheric pressure: 0.1 %/mbar, hence ± 5 % of the measurement from 930 to 1030 mbar

| Configuration | CMP (dynamic γ compensation) | DIF (ex: with SAM HTO) |
|---|---|---|
| **Measurement range** | 10 kBq/m³ to 10 TBq/m³<br>*0.27 µCi/m³ to 270 Ci/m³* | 10 kBq/m³ to 10 TBq/m³<br>*0.27 µCi/m³ to 270 Ci/m³* |
| **Limit of detection (2σ)**<br>**= decision threshold** | 45 kBq/m³<br>*1.22 µCi/m³* | 60 kBq/m³<br>*1.62 µCi/m³* |
| **Limit of detection (4σ)** | 90 kBq/m³<br>*2.43 µCi/m³* | 120 kBq/m³<br>*3.24 µCi/m³* |
| **Precision** | 5% of measurement ± 45 kBq/m³<br>*± 1.22 µCi/m³* | 5% of measurement ± 60 kBq/m³<br>*± 1.62 µCi/m³* |
| **Variation max** | 45 kBq/m³/year *(1.22 µCi/m³/year)* | 60 kBq/m³/year *(1.62 µCi/m³/year)* |
| **Noise (2σ)** | 45 kBq/m³ *(1.22 µCi/m³)* | 60 kBq/m³ *(1.62 µCi/m³)* |
| **Response time** | < 90 sec at 90% of step | |




Injection of 1 MBq/m³ *(27 µCi/m³)* tritium in the form of HT, then of 2 MBq/m³ *(54 µCi/m³)* of tritium in the form of HTO. The injection of HT is then stopped and finally the injection of HTO is stopped

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# DT D - IC500™

*500 cc Tritium Detector*

Ionization chamber for the detection and measurement of high activities for research application in laboratories and for the control of glovebox ambiance.

## FEATURES

- **High-performance**
  - Continuous measurement
  - Wide measurement range
  - Response time under 60 seconds
- **Simple**
  - Easy maintenance
  - Quick and easy set up
- **Reliable**
  - Precise and stable

## DESCRIPTION

The DT D - IC500 detector is a medium-sized ionization chamber (500 cc) allowing the measurement of high tritium activities in gases from 3.8 kBq/m$^3$ *(0.103 µCi/m$^3$)* to 3.8 TBq/m$^3$ *(103 Ci/m$^3$)*.

This detector has been designed for civil and military research applications, as well as specific projects such as ITER where measurement of high activities is needed.

Due to its design, this detector is particularly not sensible to the marking effect, making it one of the best possible choice for the measurement of important activities.

Mounted on a leak-proof feedthroughs, it can be installed on gloveboxe outlet. It does not generally require an additional pump as it is usually mounted directly in the gas flow to be analyzed.

# DT D - IC500 | 500 CC TRITIUM DETECTOR

## GENERAL CHARCTERISTICS

- Dimensions Ø 67 x 157 mm
- Weight 300 g
- Power-supply 9-36VDC, 300mA
- Radon compensation dynamic by digital filtration

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## IONIZATION CHAMBER

- Materials 316L stainless steel - DELRIN - Brass
- Ionization volume 500 cc
- Circulation volume 1 400 cc (ACC CCG 1400)
- Nominal flow rate 6 000 cc/min
- Response coefficient 95 500 (Bq/m³)/fA
- Ionization voltage 160 VDC

## MOUNTING

- Mounting on leak-proof feedthroughs:
  - Flanged (ref: DT PE - B160L / DT PE - B180L)
  - Adjustable (ref: DT PE - BTE)
  - Straight (ref: DT PE - BTD)
- Integration in circulation chamber:
  - 1 375cc (ref: ACC CCG 1400)

## OPERATING CONDITIONS

- Temperature of use: 0 to 40°C *(32 to 104°F)*
- Influence of temperature: 0.3% /°C for a variation of ambiant temperature < 3°C / hour
- Humidity: from 5 to 95% rel.
- Influence of humidity: ± 1 % of measurement from 10 to 90% relative humidity
- Influence of atmospheric pressure: 0.1 %/mbar, hence ± 5 % of the measurement form 930 to 1030 mbar

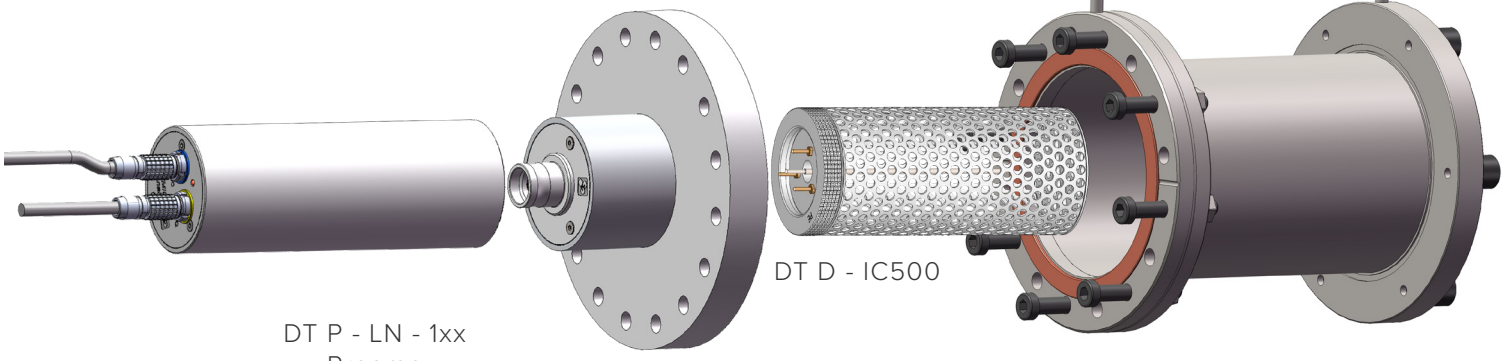
## INTEGRATION OF MEASUREMENT CHANNEL DETECTOR


DT IONIX 3
HMI Interface

## PERFORMANCES (for tritium)

- Measurement range 3.8 kBq/m³ to 3.8 TBq/m³ *103 nCi/m³ to 103 Ci/m³*
- Limit of detection (2σ) = decision threshold 15 kBq/m³ *(0.41 µCi/m³)*
- Limit of detection (4σ) 30 kBq/m³ *(0.81 µCi/m³)*
- Precision 5% of measurement ± 15 kBq/m³ *± 0.41 µCi/m³*
- Maximum deviation 15 kBq/m³ / year *(0.41 µCi/m³)*
- Noise (2σ) 15 kBq/m³ *(0.41 µCi/m³)*
- Response time < 60 sec at 90% of step

DT PE - B180L
Leak-tight feedthrough



DT P - LN - 1xx
Preamp

DT D - IC500

ACC CCG 1400
Circulation chamber

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# DT D - BM8™

*660 cc Tritium Detector*


Ionization chamber for use in the field or radioprotection, environmental monitoring and process surveillance.

## FEATURES

- **High performance**
  - Continuous measurement
  - Wide measurement range
  - Response time under 75 seconds
- **Simple**
  - Maintenance-free
  - Quick and easy commissioning
- **Reliable**
  - Precise and stable

## DESCRIPTION

The DT D - BM8 is a medium-sized ionization chamber (660 cc) detector providing a wide measurement range from 3.2 kBq/m$^3$ *(86 nCi/m$^3$)* to 3.2 TBq/m$^3$ *(86 Ci/m$^3$)*.

This robustly-housed detector is adapted for the measurement of all ranges of activity.

The detector can be connected to a DT ionix 3 touchscreen Human Machine Interface that can be installed several hundred meters away from the detector, it benefits from the most advanced features such as data extraction via USB, Modbus communication dry contact outputs...

# DT D - BM8 | 660 CC TRITIUM DETECTOR

## GENERAL CHARACTERISTICS

| | |
|---|---|
| • Dimensions | 139 x 112 x 140 mm (w x h x d) |
| • Weight | env. 4 kg |
| • Power supply | 9-36VDC, 300mA |
| • Power supply connector | baseplate LEMO ENB. 1B.304.CLL |
| • CAN Connector | baseplate LEMO ENG. 1B.304.CLL |
| • Radon compensation | dynamic with digital filtration |

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## IONIZATION CHAMBER

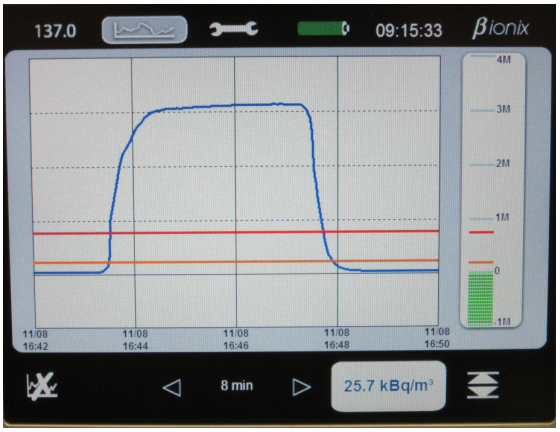
| | |
|---|---|
| • Material | 304L stainless steel electropolished |
| • Volume | 660 cc |
| • Nominal flow | 4 L/min |
| • Response coefficient | 71 200 (Bq/m³)/fA |
| • Ionization voltage | 160 VDC |

## PERFORMANCES (for tritium)

| | |
|---|---|
| • Measurement range | 3.2 kBq/m³ to 3.2 TBq/m³<br>*86 nCi/m³ to 86 Ci/m³* |
| • Limit of detection (2σ)<br>= decision threshold | 10 kBq/m³ *(0.27 µCi/m³)* |
| • Limit of detection (4σ) | 20 kBq/m³ *(0.54 µCi/m³)* |
| • Precision | 5% of measurement ± 10 kBq/m³<br>*± 0.27 µCi/m³* |
| • Maximum deviation | 10 kBq/m³ / year *(0.27 µCi/m³)* |
| • Noise (2σ) | 10 kBq/m³ *(0.27 µCi/m³)* |
| • Response time | < 75 sec at 90% of step |

## OPERATING CONDITIONS

- Temperature of use: +0°C to +40°C *(+32°F to +104°F)*
- Influence of temperature: 0.3% /°C for a variation of ambiant temperature < 3°C / hour
- Humidity: from 5 to 95% relative
- Influence of humidity: ± 1 % of the measurement from 10 to 90% relative humidity
- Influence of atmospheric pressure: 0.1 %/mbar, hence ± 5 % of the measurement form 930 to 1030 mbar



Response to a 3 MBq/m³ *(81 µCi/m³)* gas injection

Response to a 1.6 MBq/m³ *(43 µCi/m³)* gas injection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activity measurement
Tritium
Test report
DT D – BM8
# XXXX
Laboratoire d'essais LAB IONIX
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57140 NORROY LE VENEUR
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Calibration reports available, gas calibration made upon request

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# DT D - BM8 - HE™

*Highly Leak-resistant Tritium Detector*


Ionization chamber for use in the field or radioprotection, environmental monitoring and process monitoring.

## FEATURES

- **High performance**
  - Continuous measurement
  - Wide measurement range
  - Response time under 75 seconds
- **Simple**
  - Maintenance-free
  - Quick and easy commissioning
- **Reliable**
  - Precise and stable
  - Highly leak-resistant

## DESCRIPTION

The DT D - BM8 - HE is a medium-sized ionisation chamber (660 cc) detector providing a wide measurement range from 3.2 kBq/m$^3$ *(86 nCi/m$^3$)* to 3.2 TBq/m$^3$ *(86 Ci/m$^3$)*.

This robustly-housed detector is adapted for the measurement of all ranges of activity.

Thanks to its high leak-tightness it is completely adapted to the measurement of high activities without risk of potential leak.

The detector can be connected to a DT ionix 3 touchscreen Human Machine Interface that can be installed several hundred meters away from the detector, it benefits from the most advanced features such as data extraction via USB, Modbus communication dry contact outputs...

# DT D - BM8 - HE | HIGHLY LEAK-RESISTANT TRITIUM DETECTOR

## GENERAL CHARACTERISTICS

| | |
|---|---|
| • Dimensions | 140 x 111 x 197 mm (w x h x d) |
| • Weight | env. 4 kg |
| • Power supply | 9-36VDC, 300mA |
| • Power supply connector | baseplate LEMO ENB. 1B.304.CLL |
| • CAN Connector | baseplate LEMO ENG. 1B.304.CLL |
| • Radon compensation | dynamic with digital filtering |

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## IONIZATION CHAMBER

| | |
|---|---|
| • Material | 304L stainless steel electropolished |
| • Volume | 660 cc |
| • Nominal flow | 4 L/min |
| • Response coefficient | 71 200 (Bq/m³)/fA |
| • Ionization voltage | 160 VDC |

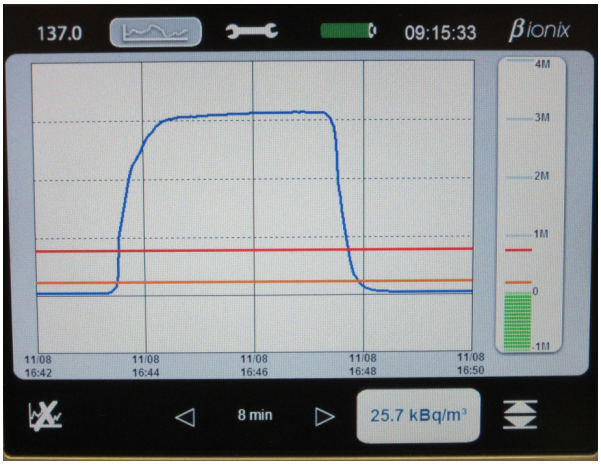
## PERFORMANCES (for tritium)

| | |
|---|---|
| • Measurement range | 3.2 kBq/m³ to 3.2 TBq/m³<br>*86 nCi/m³ to 86 Ci/m³* |
| • Limit of detection (2σ)<br>= decision threshold | 10 kBq/m³ *(0.27 µCi/m³)* |
| • Limit of detection (4σ) | 20 kBq/m³ *(0.54 µCi/m³)* |
| • Precision | 5% of measurement ± 10 kBq/m³<br>*± 0.27 µCi/m³* |
| • Maximum deviation | 10 kBq/m³ / year *(0.27 µCi/m³)* |
| • Noise (2σ) | 10 kBq/m³ *(0.27 µCi/m³)* |
| • Response time | < 75 sec at 90% of step |

## OPERATING CONDITIONS

- Temperature of use: +0°C to +40°C *(+32°F to +104°F)*
- Influence of temperature: 0.3% /°C for a variation of ambiant temperature < 3°C / hour
- Humidity: from 5 to 95% relative
- Influence of humidity: ± 1 % of the measurement from 10 to 90% relative humidity
- Influence of atmospheric pressure: 0.1 %/mbar, hence ± 5 % of the measurement form 930 1030 mbar


Leak rate < 1 .10$^{-9}$ mbar.L.s$^{-1}$ (He)




Response to a 3 MBq/m³ (*81 µCi/m³*) gas injection


Calibration reports available, gas calibration made upon request

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# DT D - EXP40™

*4 200 cc Tritium Detector*


4L ionization chamber for use in the field or radioprotection, environmental monitoring, process control, laboratory and decommissioning surveillance.

## FEATURES

- **High performance**
  - Continuous measurement
  - Wide measurement range
  - Response time under 3 minutes
- **Easy to use**
  - Easy maintenance
  - User-friendly interface
  - Quick and easy commissioning
- **Reliable**
  - Precise and stable

## DESCRIPTION

The DT D - EXP40 detector is an important-volume ionization chamber (4 200 cc) allowing for the measurement of tritium activities in gases from 2 kBq/m$^3$ *(54 nCi/m$^3$)* to 2 GBq/m$^3$ *(54 mCi/m$^3$)*.

Compact and high-performance, it combines under one case a 4 200 cc ionization chamber inside its circulation chamber as well as an attached preamplifier.

Usually integrated in M ionix or C ionix - EXX, the DT D - EXP40 can be installed with a reference detector for a dynamic and automatic gamma compensation.

The detector can be connected to a DT ionix 3 touchscreen Human Machine Interface that can be installed several hundred meters away from the detector. It also benefits from the most advanced features such as data extraction via USB, Modbus communication dry contact outputs...

# DT D - EXP40 | 4 200 CC TRITIUM DETECTOR

## GENERAL CHARACTERISTICS

| | |
|---|---|
| • Dimensions | Ø 224 x 438 mm |
| • Weight | 13 kg |
| • Installation | to be screwed |
| • Power-supply | 9-36VDC, 300mA |
| • Power-supply connector | baseplate LEMO ENG. 1B.302.CLL |
| • CAN connector | baseplate LEMO ENG. 1B.304.CLL |
| • Gas connexion | DN 25KF coupling |
| • Radon compensation | dynamic by digital filtration |

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## IONIZATION CHAMBER

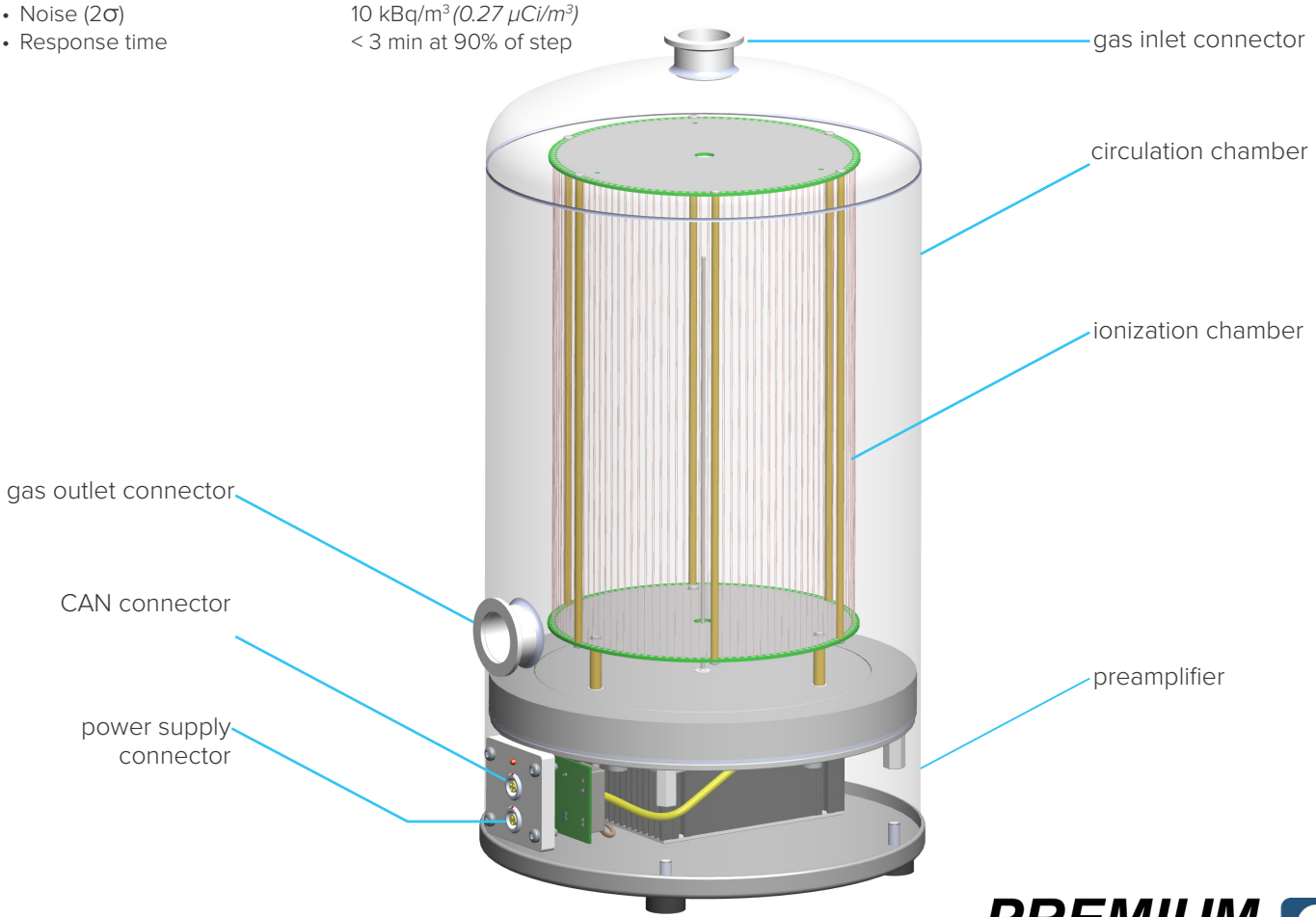
| | |
|---|---|
| • Material | 304L bead blasted stainless steel |
| • Volume | 4 200cc |
| • Circulation chamber volume | 12 000 cc |
| • Nominal flow rate | 15L/min |
| • Response coefficient | 10 200 (Bq/m³)/fA |
| • Ionization voltage | 160 VDC |

## PERFORMANCES (for tritium)

| | |
|---|---|
| • Measurement range | 2 kBq/m³ to 2 GBq/m³ *(54 nCi/m³ to 54 mCi/m³)* |
| • Limit of detection (2σ) = decision threshold | 10 kBq/m³ *(0.27 µCi/m³)* |
| • Limit of detection (4σ) | 20 kBq/m³ *(0.54 µCi/m³)* |
| • Precision | 5% of measurement ± 10 kBq/m³ *± 0.27 µCi/m³* |
| • Maximum deviation | 10 kBq/m³ / year *(0.27 µCi/m³)* |
| • Noise (2σ) | 10 kBq/m³ *(0.27 µCi/m³)* |
| • Response time | < 3 min at 90% of step |

## OPERATING CONDITIONS

- Temperature of use: +0°C to +40°C *(+32°F to +104°F)*
- Influence of temperature: 0.3% /°C for a variation of ambiant temperature < 3°C / hour
- Humidity: from 5 to 95% rel.
- Influence of humidity: ± 1 % of measurement from 10 to 90% of relative humidity
- Influence of atmospheric pressure: 0.1 %/mbar, hence ± 5 % of measurement from 930 to 1030 mbar

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# DT D - XPR80™

*On-line Tritium Detector*


8 L ionization chamber for use in the field or for radioprotection, environmental monitoring and process surveillance.

## FEATURES

- **High performance**
  - Precise and stable
  - Continuous measurement
  - Tritium detection from 5 kBq/m³ (0.135 µCi/m³)
  - Response time under 90 seconds
- **Simple**
  - Easy maintenance
  - Accessible electronics
  - Direct in-line measurement
  - Quick and easy commissioning
- **Customizable**
  - Several configurations available
  - Several filtration systems available

## DESCRIPTION

The DT D - XPR80 detector is a high-volume ionization chamber (8 000 cc) allowing for tritium activities in gases from 2 kBq/m³ to 2 GBq/m³.

The XPR80 is unique thanks to its compacity. It includes an interchangeable particles filter with a gas heating system preventing any condensation. It can be connected to a flange circulator allowing to generate a gas stream in the detector.

The XPR80 also has the advantage of having the preamplifier on the outside, allowing for easy potential maintenance operations.

Connected to a DT ionix 3 touchscreen Human Machine Interface that can be installed sever hundred meters away from the detector. It also benefits from the most advanced features such as data extraction via USB, Modbus communication dry contact outputs...

# DT D - XPR80 | ON-LINE TRITIUM DETECTOR

## GENERAL CHARACTERISTICS

- Dimensions: Ø 215 x 626 mm
- Weight: 21 kg (with filter, no circulator)
- Installation: direct on piping or with accessory support **XPR ACC FIX**
- Power-supply: 9-36VDC, 300mA
- Power-supply connector: baseplate LEMO EXG. 1B.302
- CAN connection: baseplate LEMO EXG. 1B.304
- Gas connectiion: flange DN 160 mm 8xM8 on 1 198 mm diameter
- Radon compensation: dynamic by digital filtration

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## IONIZATION CHAMBER

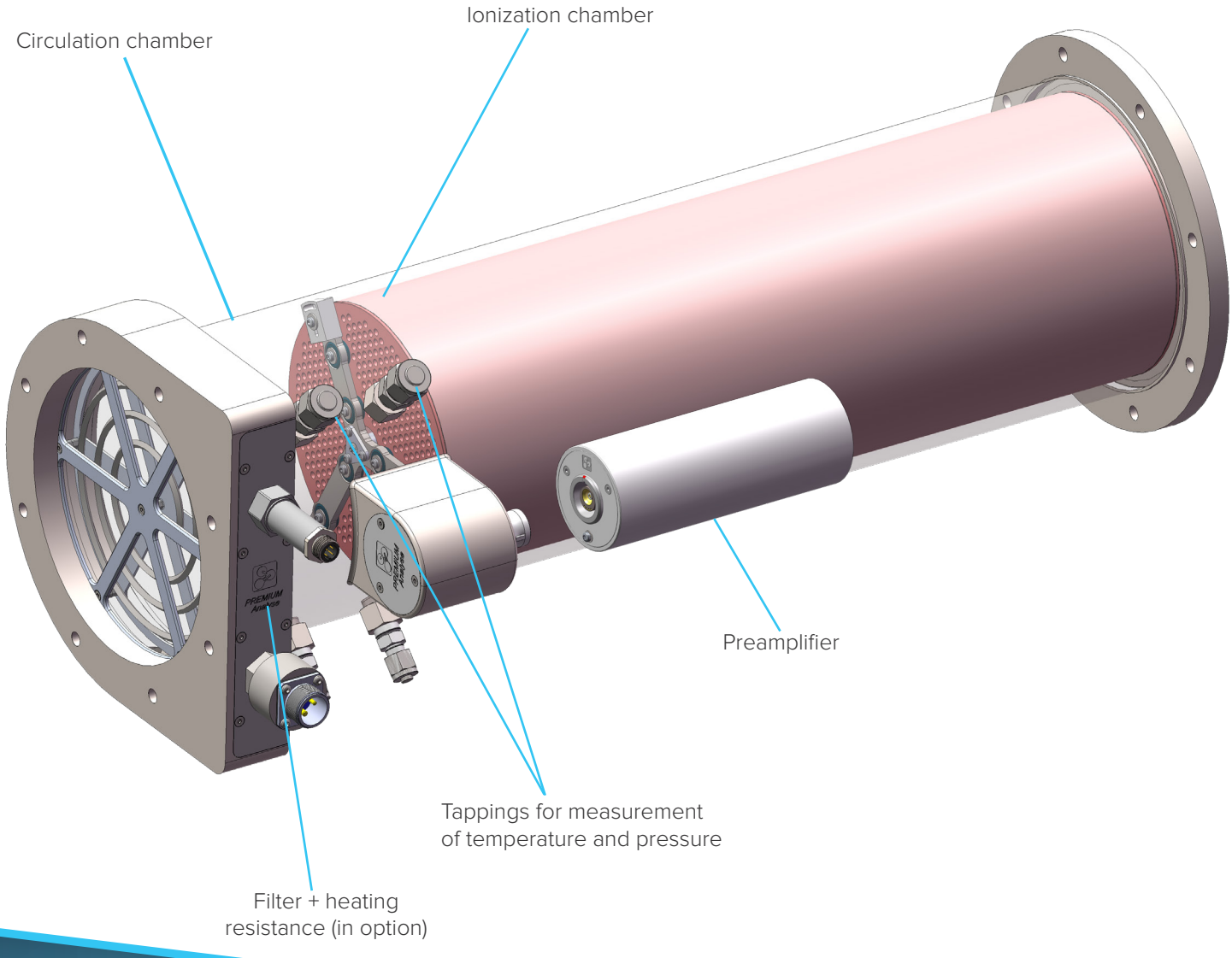
- Material: INOX 304L electropolished
- Ionization volume: 8 000 cc
- Circulation chamber volume: 12 000 cc
- Nominal flow rate: 70 L/min
- Response coefficient: 5 050 (Bq/m³)/fA
- Ionization voltage: 160 VDC

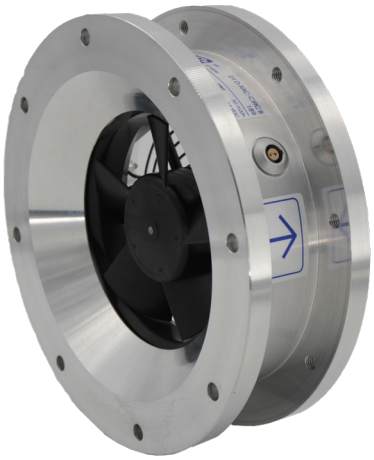
## PERFORMANCES (For tritium)

- Measurement range: 2 kBq/m³ to 2 GBq/m³ *(54 nCi/m³ to 54 mCi/m³)*
- Limit of detection (2σ) = decision threshold: 5 kBq/m³ *(0.135 µCi/m³)*
- Limit of detection (4σ): 10 kBq/m³ *(0.27 µCi/m³)*
- Precision[101]: 5% of measurement ± 5 kBq/m *± 0.135 µCi/m³*
- Maximum deviation: 5 kBq/m³ / year (*0.135 µCi/m³*)
- Noise (2σ): 5 kBq/m³ (*0.135 µCi/m³*)
- Response time: < 90 seconds at 90% of step

## OPERATING CONDITIONS

- Temperature of use: +0°C to +40°C *(+32°F to +104°F)*
- Influence of temperature: 0.3% /°C for a variation of ambiant temperature < 3°C / hour
- Humidity: from 5 to 95% rel.
- Influence of humidity: ± 1 % of measurement from 10 to 90% of relative humidity
- Influence of atmospheric pressure: 0.1 %/mbar, hence ± 5 % of measurement from 930 to 1030 mbar



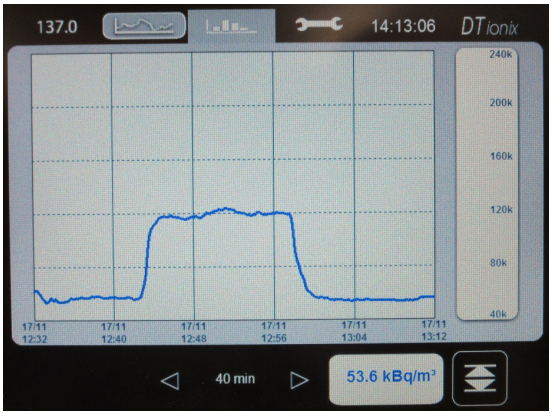


## DT D - XAC - CIRCB

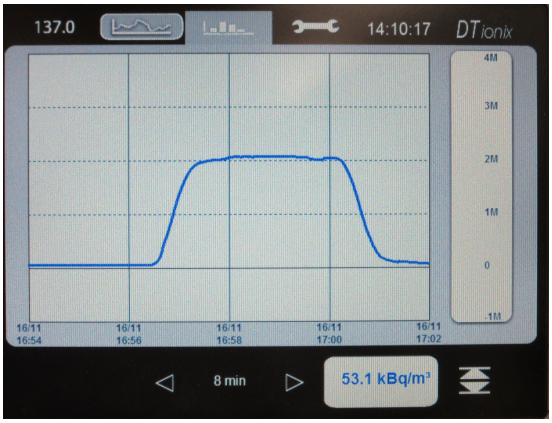
Flanged circulator, to be mounted after the ionization chamber
Nominal flow 60 L/min
Allows the creation of a gas glow

## XPR ACC TFL CF4

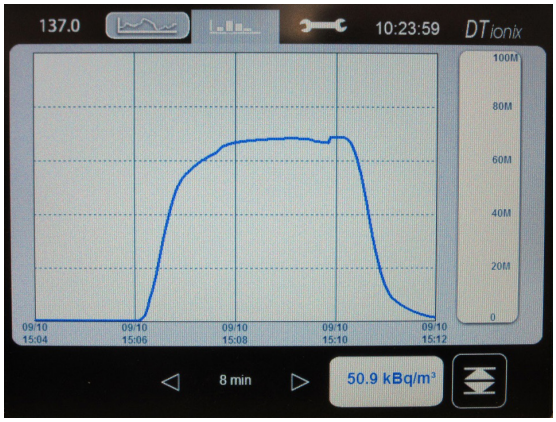
Filter unit with heating resistance
400W power
Prevents the condensation of gas




Response to a 120 kBq/m³ injection




Response to a 2 MBq/m³ injection




Response to a 70 MBq/m³ injection

## GAS CALIBRATION

Due to our internal laboratory, we are able to calibrate all of our detectors thanks to standard gas samples generated.

Tests are made according to NF EN 60761-1 and -5 standards.


PREMIUM Analyse
always one idea ahead
activity measurement
$^{85}$Kr $^{133}$Xe $^{222}$Rn $^{14}$C Tritium

*Tritium calibration report*

*DT D – XPR 80* *#XXX*



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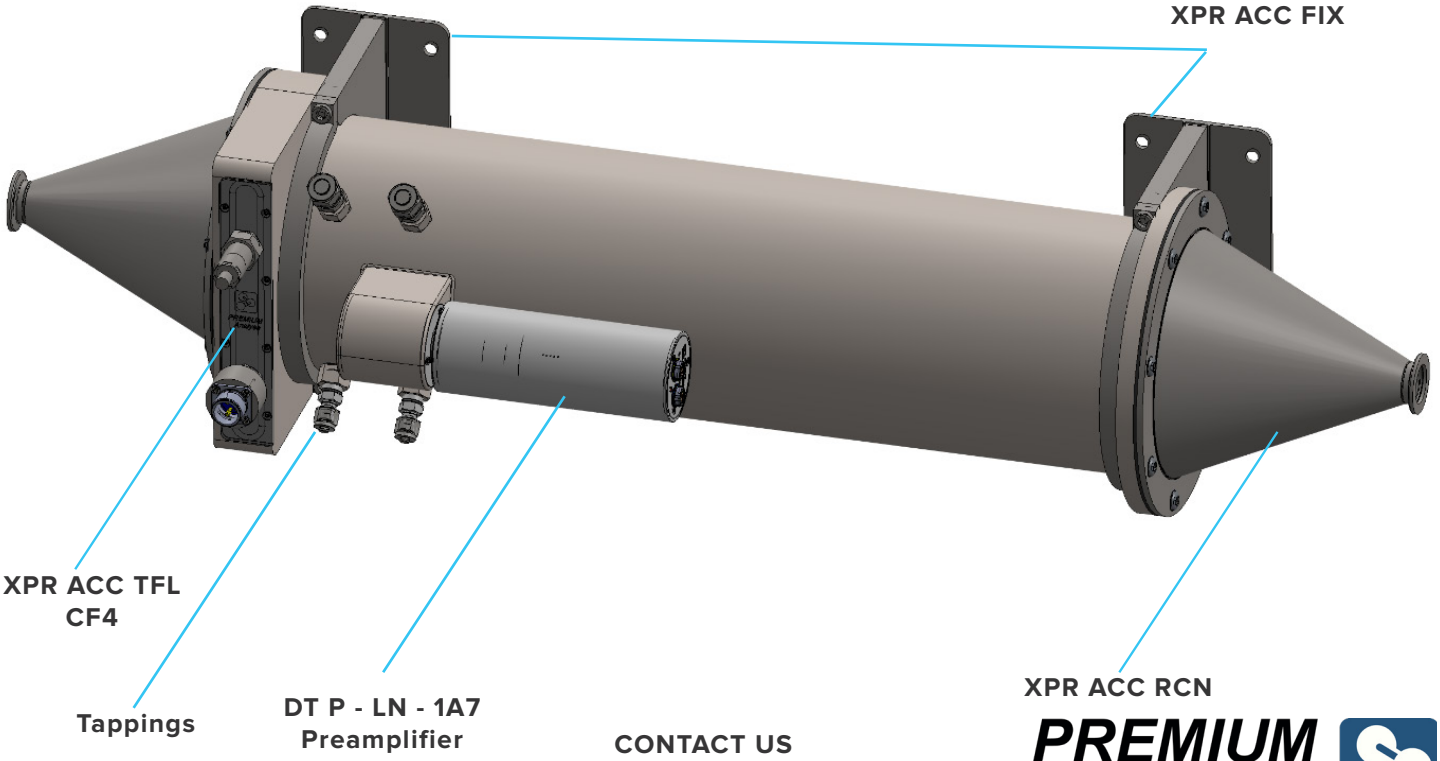
Calibration report

# DT D - XPR80 | ON-LINE TRITIUM DETECTOR

| Reference | |
|---|---|
| Inline activity detector<br>4 tappings, aluminum filter | DT D XPR - 80 - FA0 |
| Inline activity detector<br>4 tappings, heating filter, PT100 3 cables probe | DT D XPR - 80 - FC0 |
| Inline activity detector<br>4 tappings, heating filter, PT100 4-20mA probe | DT D XPR - 80 - FCA |
| Inline activity detector<br>4 tappings with SWA 6-10mm connector, heating filter, PT100 4-20mA probe | DT D XPR - 80 - 018 |
| Inline activity detector<br>Heating filter, PT100 4-20mA probe | DT D XPR - 80 - 137 |

| Accessories | |
|---|---|
| Flanged circulator 60 L/min | DT D - XAC - CIRCB |
| Ambiance circulator 60 L/min | DT D - XAC - CIRCA |
| Heating regulation box | DT D - XCE - 10100 - 000 - 018 |
| Conical reducer | XPR ACC RCN |
| Installation system | XPR ACC FIX |
| Aluminum filter | XPR ACC TFA |
| Heating filter with PT100 probe | XPR ACC TFL CFG |
| Heating filter with 4-20mA probe | XPR ACC TFL CF4 |
| Vertical mounting accessory for preamp | XPR ACC PLN FIX |

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SPC-71-EN-A_RMSD - 09/2021

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