Maximum protection from infection for your safety and well-being

Class II Microbiological Safety Cabinet
BERNER FlowSafe®
Modell B-[MaxPro]
**Optimal protection from infection when handling biological substances**

- **Safe handling of biological substances**
  B-[MaxPro] class II microbiological safety cabinets were developed for particularly safe handling of biological substances that carry a high risk of infection. The equipment in the BERNER FlowSafe® product group ensures maximum personal, product and cross contamination protection.

  When handling biological substances, use innovative solutions for your safety: class II microbiological safety cabinets from BERNER.

- **Comprehensive protection at safety levels 1 – 4**
  Biological substances are divided into 4 risk groups based on their infectious, allergic and toxic potential. Risk groups 1 – 4 correspond to protection and safety levels in laboratories. A protection level covers all technical, organisational and personal safety measures taken in the laboratory. B-[MaxPro] class II microbiological safety cabinets are the ideal way to ensure maximum safety at protection levels 1 – 4.

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**Microbiological testing: The world’s leading test method for safety functions**

- **Microbiological test method used in-house**
  BERNER International is the only manufacturer in Europe that uses the globally recognised microbiological method for testing the safety functions of safety cabinets in accordance with DIN EN 12469, DIN 12980 and NSF 49 in its own quality assurance, research and development laboratories.

Airflows are exposed to bioaerosols for extensive testing of safety functions in this worst-case scenario. A nebuliser disperses the bioaerosols from an apathogenic spore suspension of Bacillus subtilis. Different sampling methods are used to collect data on the contamination caused by leaking bioaerosols and unacceptable bioaerosol levels. The samples are incubated and the data analysed.

Only microbiological safety cabinets (MSC) that eliminate the contamination in these provocation tests quickly and safely correspond to the state of the art and meet our high quality standards. You can rely on microbiologically tested safety cabinets from BERNER.

- **Perfect personal protection**
  In terms of occupational safety, containment capability at the working aperture, i.e. personal protection, is the most important function of an MSC. In order to show that the number of biological substances passing through the working aperture remains within permitted limits, we test our safety equipment based on the following parameters:

  - Dispersal of \(5 \times 10^8\) CFU* in 5 minutes.
  - No more than 10 CFU in six liquid samplers and 5 CFU in two slit-type air samplers.
  - 5 or 15 test cycles.

*CFU: colony forming units

- **Reliable product protection**
  Product protection is essential for ensuring suitable manufacturing and experimental conditions. The number of particles coming from the surrounding area into the work area must not exceed permitted limits. Our product protection must pass the following tests:

  - Dispersal of \(5 \times 10^8\) CFU in 5 minutes.
  - No more than 5 CFU on all sedimentation culture plates.
  - 3 test cycles.

- **Maximum cross contamination protection**
  Your product or experiment should be protected from cross contamination from the work area. The number of bioaerosols crossing the work area must not exceed permitted limits. The following tests show strict compliance with these parameters:

  - Dispersal of \(5 \times 10^8\) CFU in 5 minutes.
  - No more than 2 CFU on all sedimentation culture plates.
  - 6 test cycles.

**Latest safety regulations**

Independent type testing, certification and regular inspection based on the German Equipment and Product Safety Act (GPPS) ensure high quality and safety levels:

- By accredited notified body TÜV NORD CERT.
- DIN EN 12469 (September 2000) and DIN EN 12980* (June 2005).
- TÜV GS certificate and EC declaration of conformity.

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*CFU: colony forming units
Optimal protection from infection when handling biological substances

- **Safe handling of biological substances**
  B- (MaxPro) class II microbiological safety cabinets were developed for particularly safe handling of biological substances that carry a high risk of infection. The equipment in the BERNER FlowSafe® product group ensures maximum personal, product and cross contamination protection.

When handling biological substances, use innovative solutions for your safety: class II microbiological safety cabinets from BERNER.

- **Comprehensive protection at safety levels 1 – 4**
  Biological substances are divided into 4 risk groups based on their infectious, allergenic and toxic potential. Risk groups 1 – 4 correspond to protection and safety levels in laboratories. A protection level covers all technical, organisational and personal safety measures taken in the laboratory. B- (MaxPro) class II microbiological safety cabinets are the ideal way to ensure maximum safety at protection levels 1 – 4.

<table>
<thead>
<tr>
<th>Biological Substance Risk Group</th>
<th>Risk Potential</th>
<th>Prevention and Treatment</th>
<th>Protection and Safety Level</th>
<th>Safety Measure: MSC Class</th>
<th>Safety Function(s): MSC Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Very low</td>
<td>Usually not necessary</td>
<td>S1</td>
<td>Optional: I or II</td>
<td>I: Pe or II: Pe+Pr+Cr</td>
</tr>
<tr>
<td>2</td>
<td>Low</td>
<td>Possible</td>
<td>S2</td>
<td>Optional: I or II</td>
<td>I or II: Pe+Pr+Cr</td>
</tr>
<tr>
<td>3</td>
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<td>Normally possible</td>
<td>S3</td>
<td>Yes: I or II</td>
<td>I or II: Pe+Pr+Cr</td>
</tr>
<tr>
<td>4</td>
<td>Very high</td>
<td>Impossible</td>
<td>S4</td>
<td>Yes: II* or III</td>
<td>II: Pe + Pr + Cr or III: Pe</td>
</tr>
</tbody>
</table>

- **Certification**
  - Directive 2000/54/EC on the protection of workers, Directive 90/219/EC on the contained use of genetically modified microorganisms, and DIN EN 12128 specify minimum requirements for biological safety in laboratories. When working with biological substances, a risk assessment should be carried out, and the required safety measures taken and adapted to the state of the art.
  - The samples are incubated and the data analysed.

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- **Microbiological testing used in-house**
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- **Reliable product protection**
  Product protection is essential for ensuring suitable manufacturing and experimental conditions. The number of particles coming from the surrounding area into the work area must not exceed permitted limits. Our product protection must pass the following tests:

  - **Maximum cross contamination protection**
    Your product or experiment should be protected from cross contamination from the work area. The number of bioaerosols crossing the work area must not exceed permitted limits. The following tests show strict compliance with these parameters:

- **Microbiological testing**
  BERNER uses the following tests to ensure safe handling of biological substances and maximum protection for occupational safety:
  - Dispersal of $5 - 8 \times 10^4$ CFU* in 5 minutes.
  - No more than 10 CFU on six liquid samplers and 5 CFU in two slit-type air samplers.
  - 5 or 15 test cycles.

- **Microbiological testing of product protection**
  The following tests are performed to ensure that the number of biological substances passing through the working aperture remains within permitted limits:

  - Dispersal of $5 - 8 \times 10^8$ CFU* in 5 minutes.
  - No more than 5 CFU on all sedimentation culture plates.
  - 3 test cycles.

- **Microbiological testing of cross contamination protection**
  The following parameters are tested:

  - Dispersal of $5 - 8 \times 10^4$ CFU* in 5 minutes.
  - No more than 2 CFU on all sedimentation culture plates.
  - 6 test cycles.

- **Latest safety regulations**
  Independent type testing, certification and regular inspection based on the German Equipment and Product Safety Act (GPSG) ensure high quality and safety levels:

- **By accredited notified body TÜV NORD CERT.**
- **DIN EN 12469 (September 2000) and DIN 12980 (June 2005).**
- **TÜV GS certificate and EC declaration of conformity.**
- **Certified quality assurance system - DIN EN ISO 9001:2000.**

*CFU: colony forming units
The EAS – Ergonomic Advantage System: Safeguards your well-being

- **Safe handling of biological substances in an ergonomic sitting position**
  The ergonomic design of the “human-machine system” is a preventive safety measure. All activities can be undertaken comfortably and the current operating status monitored from the central sitting position. Even with the 3-filter system, the revolutionary main filter level offers you the comfort of always being able to stretch out your legs.

- **Relaxed working conditions**
  Optimal operating parameters and functional design ensure pleasant working conditions:
  - No comparable 3-filter system provides more legroom.
  - You can sit upright or lean forwards or backwards. Dynamic sitting allows you to work comfortably and prevents postural problems.
  - The window is inclined at 10° giving your upper body more room to move.
  - You sit near the procedure and within easy reach of all utensils in the work area.
  - The armrest and work areas are at the same level for a safe working position.
  - Displays are positioned in your field of vision and therefore easy to monitor.
  - All control elements are easily accessible.

- **User-friendly**
  The user-friendly design of the new control panel, BFC – BERNER FlowSafe® Control, and high-quality standard components simplify daily tasks and create a comfortable working environment:
  - Numerical codes for switching on and off and changing settings.
  - Employee-specific numerical codes.
  - Normal, cleaning and night mode.
  - Electrically operated front window.
  - Power sockets in the work area.
  - Holes in the side window for hoses, cables or other similar items.
  - Illuminated display showing the date, time, operating time, and temperature and humidity in the work area.
  - Timer for monitoring important processes, and stages of experiments and procedures.
  - Operating time meter for optional UV-C sterilisation system QuickDecon.
  - Control system circuit board with RS-232 interface.

- **Easy cleaning**
  The work area is designed to be easy to clean and made entirely of stainless steel and multi-layer safety glass. Daily cleaning and disinfection take very little time:
  - Interior consists of large continuous surfaces with few joints.
  - Segmented worktops are easy to lift up and set aside.
  - The rear and upper parts of the work area are particularly easy to clean, as the front window opens by up to 550 mm.
  - Optional UV-C sterilisation system, QuickDecon, for optimal disinfection results.

- **Very quiet, up to 52* dB(A).**
- **Bright anti-glare lighting of up to 1400** lx in the work area.
- Multi-layer safety glass with a PVB interlayer for added safety.
- Large side windows ensure a pleasant environment.
- No border on the front window for a clear view of the work area.
- Low vibration of less than 5 µm on the robust work surface.

*Measurements: *B-MaxPro*, **Measurements: *B-MaxPro X-190 model***
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- Vary your sitting posture by leaning forwards, sitting upright or leaning backwards.

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Service-friendly and tested safety cabinets

- **Fast, safe servicing**
  Easily accessible components and efficient setting of all operating parameters create perfect safety and operating conditions. Maximise your safety and save money with safe, fast and professional servicing.

- **All service work can be carried out from the front.**
- **Efficient setting of all operating parameters.**
- **Very precise adjustment of flow conditions.**
- **Rapid filter change.**
- **Connections for filter testing in the clean area.**
- **Electrical components are located on a service panel.**
- **Connections for filter testing in the clean area.**
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- **Tested for your safety**
Only microbiological safety cabinets (MSC) that have been tested regularly provide maximum protection. That is why our engineers and technicians carry out extensive state-of-the-art tests during development, production, installation and operation.

- **Comprehensive inspection protocols with reproducible results.**
- **Service technicians trained and individually certified by TÜV NORD CERT.**

![Image](image1.png)

- **Development Type test**
- **Production Routine test**
- **Installation Commissioning test**
- **Operation Routine test**

**On-site testing of personal protection with the KI discus test.**

2-Filter system: Innovative technology for your safety

- **Powerful airflow at all times**
The stable barrier of air in the working aperture and a laminar downflow with no backflow ensure the best possible personal, product and cross contamination protection. Flow conditions are controlled and monitored by the new microprocessor-controlled safety centre, BFC – BERNER FlowSafe® Control. This is innovative and intelligent air technology for your safety:

  1. The low front intake port keeps the entire working aperture extremely safe.
  2. BPP – Best-Pressure-Plenum ensures an even distribution of air and rapid particle transport.
  3. IDR – Inflow-Downflow-Regulator for ideal flow conditions.
  4. BGP – Block-Guard-Plus in the exhaust air ensures maximum personal protection.

- **The BFC – BERNER FlowSafe® Control safety centre monitors the power supply, window position, flow conditions and filter status.**
- **Clear fault signal displayed with detailed fault diagnosis.**
- **Power failure alarm with 24-hour battery back-up.**
- **Safe low pressure and gas-proof casing: all contamination remains safely inside the casing.**
- **High air exchange rate of at least 1668/h in the work area:**
  - Rapid elimination of contamination.
  - Perfect aseptic and particle-free production and experimental conditions.
- **Coarse dust filter* and unfiltered air intake guard made of stainless steel to protect filters from tiny parts.**
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  - Connections for filter testing in the clean area.
  - All components after the main filter* are in the clean area.
  - Electrical components are located on a service panel.
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  - The BGP – Block-Guard-Plus in the exhaust air ensures maximum personal protection.
  - Sensor-controlled electronic regulation of the fans safeguards compensation of filter contamination.

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On-site testing of personal protection with the KI discus test.
3-Filter System: Special filter technology for noticeably higher safety levels

New filter system for extra safety and optimal waste management
In laboratories, particularly safety level 3 and 4 laboratories, the use of 3-filter systems is strongly recommended. In addition to all of the features of the 2-filter system, the third HEPA filter level offers further important benefits.

For example, DIN EN 12469 requires contaminated air channels to be as short as possible. For this requirement to be met consistently, a 3-filter system with a HEPA filter level directly below the work surface must be used.

Many laboratories have to decontaminate waste, particularly contaminated filters directly on site. The new HEPA cartridge filters, BFP – Best-Filter-Protection, are impressive because they are very small and can be changed quickly and safely with little contamination. Used filters also fit into small laboratory autoclaves, and disinfection and waste transport containers for decontamination.

Double protection and immediate filtration
With its innovative filter arrangement, the 3-filter system provides twice as much personal, product and cross contamination protection as a 2-filter system:

- Redundant HEPA filter system.
- The very high degree of filtration, overall 99.999 999 75% in MPPS*, provides more protection than class U17 ULPA** filters.
- The main filter level directly below the work surface filters out particulate contamination immediately.
- In general, recirculation and exhaust air filters do not have to be changed.
- No unnecessary contamination of inaccessible areas.
- Laborious and cost-intensive fumigation, as required with 2-filter systems, is not usually necessary.

Unique filter technology
The patented main filter system with its BFP – Best-Filter-Protection cartridge filters provides a noticeably higher level of safety and performance than conventional wedge filter systems:

- H14 HEPA filters complying with DIN EN 1822-1.
- Improved seal seat thanks to continuous flexible PU seals.
- Round shape channels air perfectly.
- Low sound level.
- Optimal filter medium flow.
- Large effective filter area for greater performance and durability.
- A guard on the clean air side ensures safe installation and removal.
- Half as many filter components as conventional wedge filter systems.
- Reduction in subsequent costs due to durability and less time spent on replacement and testing.

Optimal waste management: easy decontamination and disposal
The carefully chosen, handy size of the cartridge filters enables replacement, decontamination and disposal to be carried out safely. Innovative filter technology for safe waste management:

- Much smaller and more compact design than comparable wedge filter systems.
- Low-contamination filter replacement in accordance with DIN 12980.
- The filter cartridges fit into many laboratory autoclaves, and disinfection and waste disposal containers for thermal and/or chemical decontamination.

Perfect filter protection
All filters, particularly the main filters below the work surface, are protected from mechanical damage and unsuitable loads, as only undamaged filters provide reliable protection for you and the environment:

- The patented SLG – Spill-Liquid-Guard keeps spill liquids away from the main filter.
- Guards prevent mechanical damage to the filters, e.g. while the work area is being cleaned.
- All filters have eye protection and a finger guard.

- Main filters are protected from liquid and tiny parts.
3-Filter System: Special filter technology for noticeably higher safety levels

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*High Efficiency Particulate Air*

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*Most Penetrating Particle Size. **Ultra Low Penetration Air*

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- All filters have eye protection and a finger guard.
Optional flexibility

- Optional extras
Comprehensive equipment creates pleasant and safe working conditions.

- Seated or standing workstation
Steadiness, stability and ergonomics are the outstanding features of the base frames. The C-shaped base frame provides unlimited legroom at the sides.

- Optional extras

- Ergonomic computer workstation
Avoid uncomfortable sitting positions and increase your safety with a computer workstation ergonomically integrated in your MSC:

  - With the 20" display window ErgoView, information is always visible on an external screen.
  - Flat screen holders ScreenBase and Screen Base plus, which slide off sideways for cleaning or repairs, enable flat screens to be attached outside the MSC. This rules out screen contamination and airflow disruption.
  - The integrated RS-232 interface, DataLink, enables you to send important data from the work area to your data processing system.

  *Not supplied as standard.

<table>
<thead>
<tr>
<th>Item</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Ergonomic computer workstation</td>
<td>01 01 20 7004</td>
</tr>
<tr>
<td>ErgoView display window</td>
<td>01 01 10 7012</td>
</tr>
<tr>
<td>ScreenBase flat screen holder</td>
<td>01 01 10 7015</td>
</tr>
<tr>
<td>ScreenBase plus flat screen holder</td>
<td>01 01 10 7115</td>
</tr>
<tr>
<td>DataLink RS-232 interface adapter</td>
<td>01 01 10 7003</td>
</tr>
<tr>
<td>Flat screen holders ScreenBase and Screen Base plus</td>
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- Safe discharge of exhaust air
The GMP Cover that connects the MSC to an exhaust air system without any adverse effects is also used to exhaust air from laboratories. A 3-sided GMP-compliant lining minimises the surfaces to be cleaned above the MSC. Take advantage of the GMP Cover connection for safe discharge of exhaust air and easy cleaning.

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<td>GMP Cover* for a maximum height of 1 meter with a sliding window</td>
<td>01 01 10 7012</td>
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- Activation of monitoring and ventilation systems
Floating contacts enable an external monitoring or ventilation system to be activated in order to communicate off, normal or night mode, or send alarm signals. This results in optimal co-ordination and safe operating conditions at all times.

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<td>01 01 20 7005</td>
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<tr>
<td>Night mode</td>
<td>01 01 20 7006</td>
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<tr>
<td>Activation of monitoring and ventilation systems</td>
<td>01 01 10 7003</td>
</tr>
</tbody>
</table>

- Connection to the ICM system* via a CAN- or RS-485 interface.
- Monitoring and documentation of the number of particles in the work area and diverse operational data of the MSC.
- Connection of the isokinetic probe in the work area.

- Laboratory fittings
For media such as gas and water or a vacuum, diverse laboratory fittings can be ergonomically integrated into the side windows. The BFC—BERNER FlowSafe® Control safety control system ensures that such media, particularly flammable gases, are only supplied in safe operating conditions.

  *Only applies to B-[MaxPro]®-x-130 MaxPro® and B-[MaxPro]®-x-190 MaxPro®.

<table>
<thead>
<tr>
<th>Item</th>
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<tbody>
<tr>
<td>Laboratory fitting integrated into the side window.</td>
<td>01 01 20 7004</td>
</tr>
</tbody>
</table>

- QuickDecon UV-C sterilisation system
QuickDecon, the UV-C sterilisation system installed above the work area, is extremely effective at disinfecting the work area thanks to its power (up to 220* µW/cm²) and shadow-free irradiation.

  *Only applies to B-[MaxPro]®-x-130 MaxPro® and B-[MaxPro]®-x-190 MaxPro®.

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<tr>
<td>QuickDecon UV-C sterilisation system</td>
<td>01 01 20 7007</td>
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</table>

- Special installation
Thanks to the modular design it can also be installed and assembled in laboratories where access is difficult. This is the perfect solution to narrow staircases, small doors, premises that are full of corners and laboratories on floors without a goods lift.

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<td>Special installation</td>
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</tr>
</tbody>
</table>

*Integral clean room monitoring is an external activity.

- Permanent clean room monitoring
Full integration of complete particle measurement technology for continuous monitoring of particles in the work area of the MSC in accordance with EC GMP guidelines. Permanent monitoring, inspection and documentation with PCM – Permanent-Cleanroom-Monitoring is the perfect solution:

  *Integral clean room monitoring is an external activity.

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<td>PCM – Permanent Clean room Monitoring</td>
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PCM – Permanent-Cleanroom-Monitoring

**Note:**

- Steadiness, stability and ergonomics are the outstanding features of the base frames. The C-shaped base frame provides unlimited legroom at the sides.
- With the 20" display window ErgoView, information is always visible on an external screen.
- Flat screen holders ScreenBase and Screen Base plus, which slide off sideways for cleaning or repairs, enable flat screens to be attached outside the MSC. This rules out screen contamination and airflow disruption.
- The integrated RS-232 interface, DataLink, enables you to send important data from the work area to your data processing system.
- QuickDecon UV-C sterilisation system
QuickDecon UV-C sterilisation system

- Activation of monitoring and ventilation systems
Floating contacts enable an external monitoring or ventilation system to be activated in order to communicate off, normal or night mode, or send alarm signals. This results in optimal co-ordination and safe operating conditions at all times.

- Connection to the ICM system* via a CAN- or RS-485 interface.
- Monitoring and documentation of the number of particles in the work area and diverse operational data of the MSC.
- Connection of the isokinetic probe in the work area.

- Laboratory fittings
For media such as gas and water or a vacuum, diverse laboratory fittings can be ergonomically integrated into the side windows. The BFC—BERNER FlowSafe® Control safety control system ensures that such media, particularly flammable gases, are only supplied in safe operating conditions.

- QuickDecon UV-C sterilisation system
QuickDecon UV-C sterilisation system installed above the work area, is extremely effective at disinfecting the work area thanks to its power (up to 220* µW/cm²) and shadow-free irradiation.

- Special installation
Thanks to the modular design it can also be installed and assembled in laboratories where access is difficult. This is the perfect solution to narrow staircases, small doors, premises that are full of corners and laboratories on floors without a goods lift.

**Note:**

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*Not supplied as standard.

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</table>
Optional flexibility

Comprehensive equipment creates pleasant and safe working conditions.

Seated or standing workstation

Steadiness, stability and ergonomics are the outstanding features of the base frames. The C-shaped base frame provides unlimited legroom at the sides.

Ergonomic computer workstation

Avoid uncomfortable sitting positions and increase your safety with a computer workstation ergonomically integrated in your MSC:

- With the 20" display window ErgoView, information is always visible on an external screen.
- Flat screen holders ScreenBase and Screen Base plus, which slide off sideways for cleaning or repairs, enable flat screens* to be attached outside the MSC. This rules out screen contamination and airflow disruption.
- The integrated RS-232 interface, DataLink, enables you to send important data from the work area to your data processing system.

ErgoView display window: important information is always visible.

ScreenBase – a flat screen holder that slides off sideways.

Safe discharge of exhaust air

The GMP Cover that connects the MSC to an exhaust air system without any adverse effects is also used to exhaust air from laboratories. A 3-sided GMP-compliant lining minimises the surfaces to be cleaned above the MSC. Take advantage of the GMP Cover connection for safe discharge of exhaust air and easy cleaning.

C-shaped base frame with unlimited legroom.

Connection to the ICM system* via a CAN- or RS-485 interface.

Monitoring and documentation of the number of particles in the work area and diverse operational data of the MSC.

QuickDeco UV-C sterilisation system

QuickDeco, the UV-C sterilisation system installed above the work area, is extremely effective at disinfecting the work area thanks to its power (up to $220 \, \mu W/cm^2$) and shadow-free irradiation.

QuickDeco UV-C sterilisation system

UV-C sterilisation system for disinfection of the work area.

Special installation

Thanks to the modular design it can also be installed and assembled in laboratories where access is difficult. This is the perfect solution to narrow staircases, small doors, premises that are full of corners and laboratories on floors without a goods lift.

Summary alarm* 01 01 10 7003

Normal mode 01 01 20 7008

Night mode 01 01 10 7007

Night mode* 01 01 10 7022

*Integral clean room monitoring is an external activity.

Table: Equipment connection

<table>
<thead>
<tr>
<th>Equipment</th>
<th>MaxPro2-120</th>
<th>MaxPro3-120</th>
</tr>
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<tbody>
<tr>
<td>Ergonomic computer workstation</td>
<td>01 01 10 7050</td>
<td>01 01 10 7060</td>
</tr>
<tr>
<td>QuickDeco UV-C sterilisation system</td>
<td>01 01 10 7012</td>
<td>01 01 20 7012</td>
</tr>
<tr>
<td>GMP Cover*</td>
<td>01 01 10 7004</td>
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*Only applies to MaxPro3-130 (up to 220* \, \mu W/cm^2) and shadow-free irradiation.
Maximum protection from infection for your safety and well-being

Class II Microbiological Safety Cabinet
BERNER FlowSafe®
Modelle B-[MaxPro]

Operating principle and dimensions [mm]
Front view:

Side view:

BERNER INTERNATIONAL GMBH
Mühlenkamp 6 • 25337 Elmshorn
Postfach 245 • 25302 Elmshorn
Germany

Made in EU