Class II Microbiological Safety Cabinet

BERNER FlowSafe®
B-[MaxPro]

Maximum protection from infection for your **safety** and **well-being**

Type tested + certified • DIN EN 12469 •

BERNER

the safety system

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** Flow**Safe**® 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.

Safe handling of biological substances.

Directive 2000/54/EC on the protection of workers, Directive 90/219/EEC on the contained use of genetically modified micro-organisms 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.

Biological Substance Risk Group	Risk Potential	Prevention and Treatment	Protection and Safety Level	Safety Measure: MSC Class	Safety Function(s): MSC Class
1	Very low	Usually not necessary	S1	Optional[a]: I or II	I: Pe or II: Pe+Pr+Cr
2	Low	Possible	S2	Optional: I or II	
3	High	Normally possible	S3	Yes: I or II[b]	
4	Very high	Impossible	S4	Yes: II[b)+c)] or III	II: Pe + Pr + Cr or III: Pe

[a]: Allergy prevention and/or product protection: class I/II MSC; [b]: 3-filter system recommended; [c]: With externally ventilated protective suits pursuant to GenTSV [German Regulation on the Safety of Genetic Engineering]; MSC: microbiological safety cabinet; Pe: personal protection or containment capability at the working aperture; Pr: product protection; Cr: cross contamination protection

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:

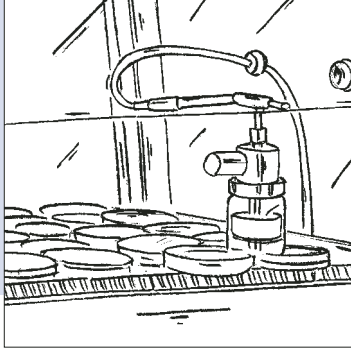
- By accredited notified body TÜV NORD CERT.
- DIN EN 12469 (September 2000) and DIN 12980* (June 2005).
- TÜV GS certificate and EC declaration of conformity.
- Certified quality assurance system - DIN EN ISO 9001:2000.

*Only B-[**MaxPro**]^3

Designed in Germany

Made in EU

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

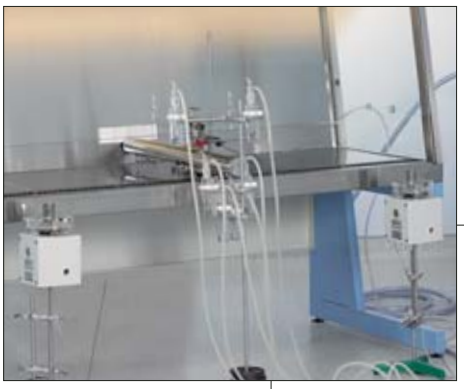


Microbiological test method used in-house

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**.



Microbiological testing of personal protection.

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:

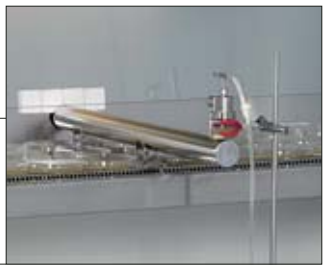
- Dispersal of 5 – 8 x 10^8 CFU* in 5 minutes.
- No more than 10 CFU in six liquid samplers and 5 CFU in two slit-type air samplers.
- 5 or 15 test cycles.

*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 – 8 x 10^6 CFU in 5 minutes.
- No more than 5 CFU on all sedimentation culture plates.
- 3 test cycles.



Microbiological testing of product protection.

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 – 8 x 10^4 CFU in 5 minutes.
- No more than 2 CFU on all sedimentation culture plates.
- 6 test cycles.

Microbiological testing of cross contamination protection.

BERNER

the safety system

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.

- **!** 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.

Vary your sitting posture by leaning forwards, sitting upright or leaning backwards.

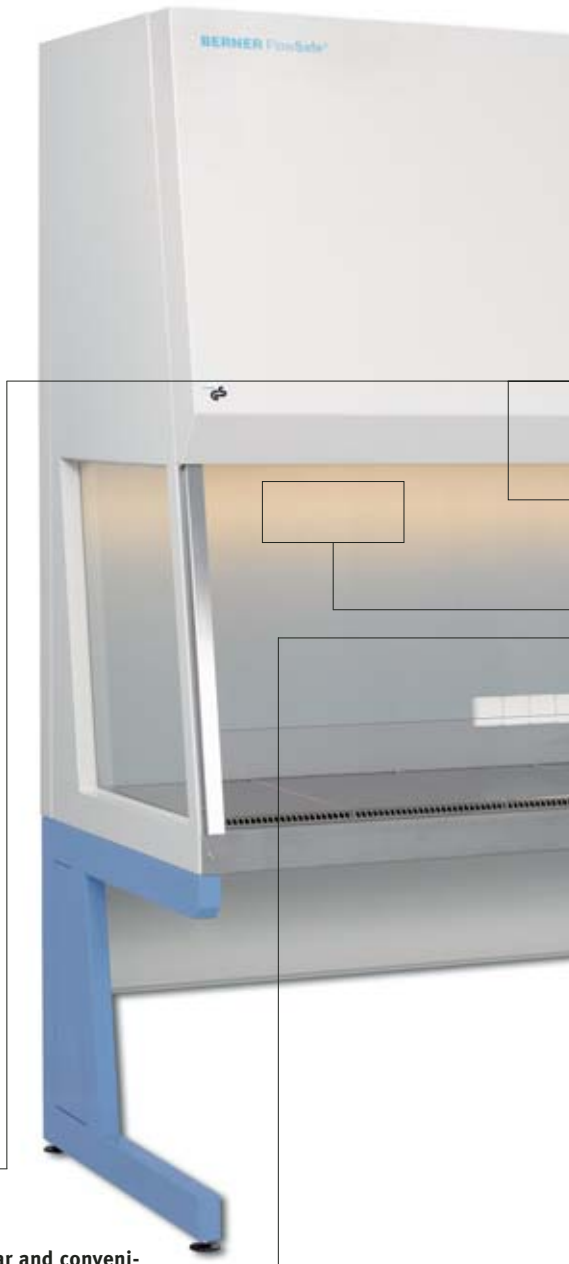
User-friendly

The user-friendly design of the new control panel, **BFC – BERNER** Flow**Safe**® **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.

Clear and convenient BFC control panel.

Side window with cable holes.



Relaxed working conditions

Optimal operating parameters and functional design ensure pleasant working conditions:

- ! 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.

*B-[**MaxPro**]^{2}-130; **B-[**MaxPro**]^{X}-190 model

Powerful anti-glare lighting and clear view of the work area.

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.

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

Easy cleaning of the work area and effortless handling of worktops.

BERNER

the safety system

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.
- All components after the main filter* are in the clean area.
- Electrical components are located on a service panel.
- ! Comprehensive inspection protocols with reproducible results.
- ! Service technicians trained and individually certified by TÜV NORD CERT.

*Only B-[**MaxPro**]^3

TÜV NORD Certification

All service work can be carried out from the front.

Easily accessible components on the service panel.

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.

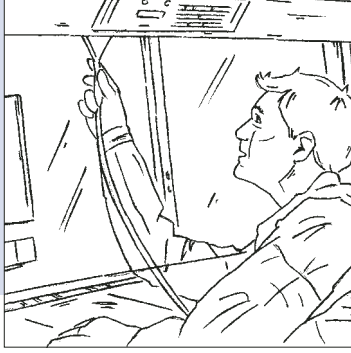
Development Type test → Production Routine test → Installation Commissioning test → Operation Routine test

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

DIN EN 12469 requirements	Tests Required by DIN EN 12469 (September 2000)			
	Test for a Class II MSC			
	Development	Production	Installation	Operation
	Responsibility			
	Manufacturer		Operator	
Airflows	✓	✓	✓	✓
Filters	✓	✓	✓	✓
Monitoring system	✓	✓	✓	✓
Materials	✓	✓	✓	✓
Functions	✓	✓	✓	✓
Electrical installation	✓	✓	✓	✓
Mechanics	✓	✓	✓	✓
Documentation	✓	✓	✓	✓
Labelling	✓	✓	✓	✓
Gas supply	✓	✓	✓	–
Exhaust air system	–	–	✓	✓
Lighting	✓	–	–	–
Sound pressure level	✓	–	–	–
Vibration	✓	–	–	–
Temperature	✓	–	–	–
Leakage protection	✓	–	–	–
Cleanability	✓	–	–	–
Ergonomics	✓	–	–	–
Personal protection	✓	–	✓*	–
Product protection	✓	–	–	–
Cross contamination protection	✓	–	–	–

*As requested and if necessary

2-Filter system: Innovative technology for your **safety**



Powerful airflow at all times

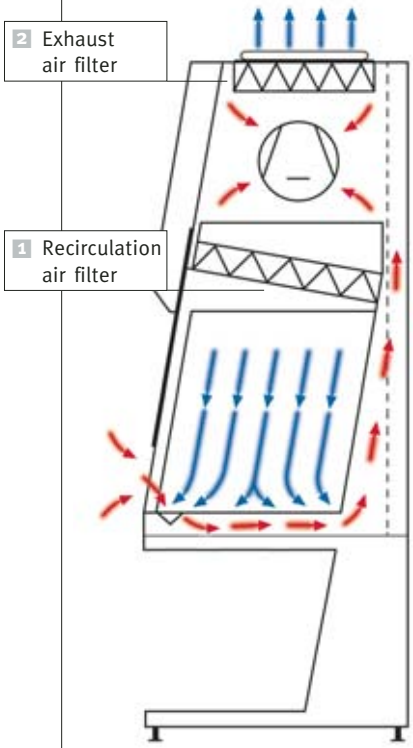
The stable barrier of air in the working aperture and a laminar downflow with no backflow, **UDF – Uniform-DownFlow**, in the work area ensure the best possible personal, product and cross contamination protection.
Flow conditions are controlled and monitored by the new microprocessor-controlled safety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

Smoke test:
Reliable and rapid extraction of contamination.

0 **Particles are removed from the work area quickly.** t = 2,2 seconds

V-shaped design ensures protection across the entire working aperture.

Design and operating principle of the 2-filter system.



- **!** The low front intake port keeps the entire working aperture extremely safe.
- **BPP – Best-Pressure-Plenum** ensures an even distribution of air and rapid particle transport.
- **IDR – Inflow-Downflow-Regulator** for ideal flow conditions.
- 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.
- **!** The **BFC – BERNER** Flow**Safe**® **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.

*Nur B-[**MaxPro**]²

Powerful airflow for optimal protection.

BERNER
the safety system

3-Filter System: Special filter technology for noticeably **higher safety levels**

New filter system for extra safety and optimal waste management

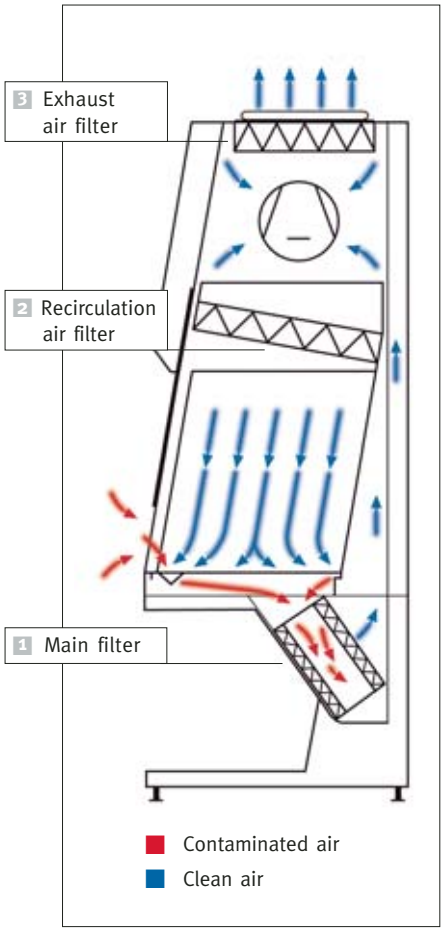
In laboratories, particularly safety level 3 and 4 laboratories, the use of 3-filter systems is strongly recommended. In addition to all of the features of the 2-filter system, the third HEPA* filter level offers further important benefits.

*High Efficiency Particulate Air

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 side. 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.

Configuration and operating principle of the 3-filter system.

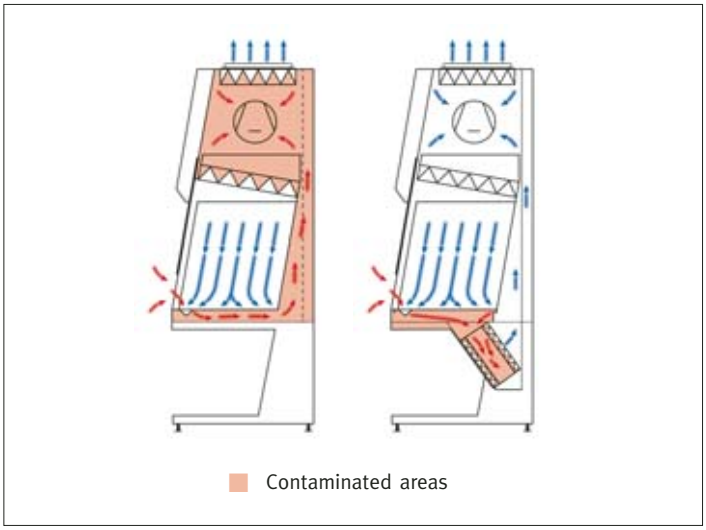


Double protection and immediate filtration

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.

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



Contaminated areas of safety cabinets with 2- and 3-filter systems.

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.

Cartridge filters: compact design with twice the performance.

Cartridge filters fit into normal waste disposal containers.

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.

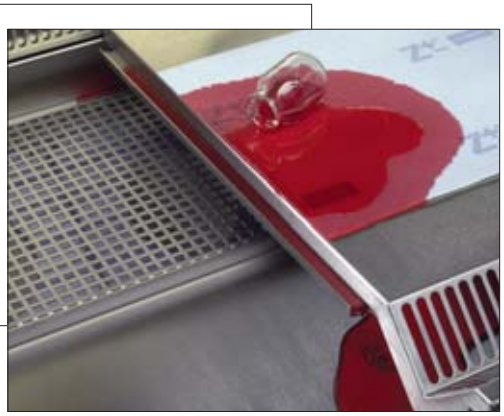
Safe and uncomplicated decontamination in autoclaves.

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 spilt 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.

BERNER

the safety system

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.

C-shaped base frame with unlimited legroom.

Item	Item Number			
C-shaped base frame	B-[**MaxPro**]²-130	B-[**MaxPro**]³-130	B-[**MaxPro**]²-190	B-[**MaxPro**]³-190
Seated workstation, height: 765 mm (±20)	01 01 20 7015	Standard	01 01 20 7017	Standard
Standing workstation, height: 1063* mm (±20)	01 01 20 7016	01 01 10 7019	01 01 20 7018	01 01 10 7020
*Total height of MSC 2513 mm; perch seat recommended.				

Ergonomic computer workstation

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

ErgoView display window: important information is always visible.

- 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.

ScreenBase – a flat screen holder that slides off sideways.

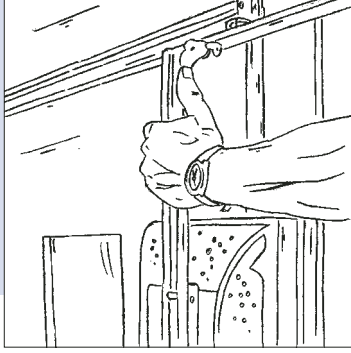
Item	Item Number	
Ergonomic computer workstation	B-[**MaxPro**]ˣ-130	B-[**MaxPro**]ˣ-190
„ErgoView“ display window	01 01 20 7004	
„ScreenBase“ flat screen holder1[1)]	01 01 10 7005[2)]	01 01 10 7105[3)]
„ScreenBase plus“ flat screen holder1[1)]	01 01 10 7015[4)]	01 01 10 7115[5)]
„Datalink“ RS-232 interface[6)]	01 01 10 7002	
RS-232 / LocalCan interface adaptor	01 01 10 7010	

1) Suitable for almost all standard flat screens with the “VESA FPMPMI 75/100 standard” on the market
2-5) There must be a space measuring at least 2) 670 mm, 3) 983 mm, 4) 340 mm and 5) 492 mm to the right or left of the MSC in the laboratory.
6) Other interfaces available on request.

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.

Item	Item Number	
	B-[**MaxPro**]ˣ-130	B-[**MaxPro**]ˣ-190
GMP Cover*	06 1635	06 1009
*Suitable for a maximum height of 3 metres with a closed ceiling.		



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.

Floating Contact	Item Number, All Models
Normal mode	01 01 20 7008
Night mode	01 01 20 7007
Summary alarm*	01 01 10 7003

*If the window position, displacement flow or air inflow produces unsafe operating conditions in normal mode.

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:

Clean Room Monitoring	Item Number, All Models
PCM – Permanent Clean room Monitoring	01 01 10 7004
Particle counter connection	01 01 10 7016

- 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.

*Integral clean room monitoring is an external activity.

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** Flow**Safe**® **Control** safety control system ensures that such media, particularly flammable gases, are only supplied in safe operating conditions.

Item no. on request.

Laboratory fitting integrated into the side window.

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}-190

Item	Item Number	
	B-[**MaxPro**]^{x}-130	B-[**MaxPro**]^{x}-190
QuickDecon UV-C sterilisation system	01 01 20 7012	01 01 20 7112

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.

Item	Item Number			
	B-[**MaxPro**]^{2}-130	B-[**MaxPro**]^{3}-130	B-[**MaxPro**]^{2}-190	B-[**MaxPro**]^{3}-190
Special installation	02 00 95	02 00 98	02 00 96	02 00 99

BERNER

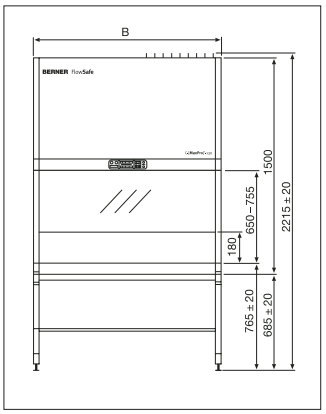
the safety system

Technical Data
Class II Microbiological Safety Cabinet
BERNER Flow**Safe**®
Modelle B-[**MaxPro**]

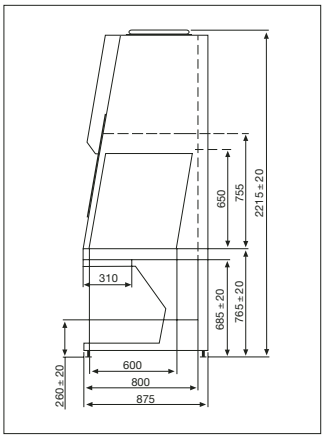
	General Data			
Product group	**BERNER** Flow**Safe**®			
Device	Laboratory device			
Device type	Class II microbiological safety cabinet			
Construction type	DIN EN 12469; DIN 12980; NSF 49			
Certificate	TÜV GS certificate			
Labelling	CE			
Produktion	DIN EN ISO 9001:2000			
Model	B-[**MaxPro**]^2-130	B-[**MaxPro**]^3-130	B-[**MaxPro**]^2-190	B-[**MaxPro**]^3-190
Item number	01 01 30 0130	01 01 20 0130	01 01 30 0190	01 01 20 0190
	General Technical Data			
Sound pressure level pursuant to ISO 11201	≤ 51.3 dB(A)	≤ 56.6 dB(A)	≤ 53.4 dB(A)	≤ 57.6 dB(A)
Nominal illuminance	> 1200 lx		> 1400 lx	
Work area material	1.5 mm thick "V2A" stainless steel, material number: 1.4301			
Casing material	1.5 mm thick, powder-coated Zincor sheet steel, material number: 1.0131			
Front, side and rear panel window	Multi-layer safety glass			
	Electrical Data			
Rated voltage and frequency	230 V AC; 50 Hz			
Rated current[a]/rated power	9.4 A/2162 VA	8.0 A/1840 VA	12.5 A/2875 VA	9.4 A/2162 VA
Protection class	I			
Type of protection	IP 20			
Connection	Three-pin plug			
[a]: The total rated current decreases by up to 5 A when not using the sockets in the work area. The total load on the sockets must not exceed 5 A!				
	Mechanical Data: Width/Height/Depth [mm]			
Overall dimensions[b], seated workstation	1340/2215 ± 20/875		1945/2215 ± 20/875	
Installation dimensions[c]	1340/1532/875 or 800 (without rear panel)		1945/1532/875 or 800 (without rear panel)	
Weight	approx. 296 kg	approx. 327 kg	approx. 400 kg	approx. 444 kg
[b]: The upper part of the device, base frame, main filter box (only B-[MaxPro]^3 model) + filters are set up and installed on-site! [c]: **Allow an extra 10 mm both horizontally and vertically.** The smallest installation dimensions (e.g. door, staircase, etc.) must be co-ordinated prior to delivery. Device height: take the pallet into account!				
	Ventilation Data			
Volumetric flow rate of downflow air	approx. 947 m³/h		approx. 1403 m³/h	
Volumetric flow rate of exhaust/inflow air	approx. 357 m³/h		approx. 541 m³/h	
AER_{normal} in the work area	approx. 1668/h			
AER_{night} in the work area	approx. 715/h			
Thermal load	7005 kJ/h	5962 kJ/h	9315 kJ/h	7005 kJ/h
Preliminary coarse dust filter	✓	–	✓	–
Main, recirculation air and exhaust air filters	HEPA filters, class ≥ H 14 in accordance with DIN EN 1822-1 Integral degree of filtration: $E \geq 99.995\%$ in MPPS			
Filter system (number of HEPA filters)	2-filter system	3-filter system	2-filter system	3-filter system
Redundant HEPA filtration	–	✓	–	✓
Low-contamination filter change	–	✓	–	✓
Number of BFP main cartridge filters	–	6	–	9
Clean room class in the work area	EC GMP Guide: A; DIN EN ISO 14644-1: 5 US Federal Standard 209E: M 3.5 / 100; VDI 2083 Blatt 1: 3			

Operating principle and dimensions [mm]

Front view:



Side view:



Made in EU

Designed in Germany

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

+49/(0)4121/4356-0
+49/(0)4121/4356-20
info@berner-international.de
www.berner-international.eu

BERNER
the safety system

GB – 12 0569 A

Last amended: 10 / 2006