



## **Products for Medical Technology**

Foot-operated switches for medical applications

# BERNSTEIN Medical Technology

The standard of tomorrow



### Safety comes from experience

BERNSTEIN is one of the world's leading providers of switches, sensors, enclosures and control panels. The company gains its innovative force and in-depth expertise in specific industrial sectors by paying meticulous attention to customer requirements.

Years of experience in mechanical engineering and electronics guarantee optimum solutions for our customers. The innovative force stemming from the three company divisions of switch, sensor and enclosure technology as well as their interconnection ensures a comprehensive range of specialised products. The synergies within our company divisions make it possible to realise signal acquisition, processing and transmission all under one roof. For over 20 years, dialogue with our customers has given rise to individual solutions for medical applications, highly tailored to suit specific customer requirements.

Today we manufacture state-of-the-art foot-operated control terminals widely used in many areas of medicine – in the operating theatre, laboratory or in dental facilities.

### Future-proof solutions

Our expertise that has grown over many years makes it possible for us to consistently meet the needs of our customers with innovative and sophisticated products and system solutions, thus expertly satisfying all user requirements. Our objective is to actively influence the technological trends in this sector so that our customers can already profit today from the technology of tomorrow.

With our extensive expertise we will find the ideal solution to your specific requirements. Get in contact with us!

# The New Generation Medical Foot-Operated Switches MF1-4

**Ergonomically designed and elegant – safe and easy to clean**

In terms of design and technology, BERNSTEIN has developed the latest product line of medical foot-operated switches to suit the specific requirements of our customers in the medical field. The switches based on modern design feature reliable, patented technology that sets standards in terms of functional diversity, ergonomics and ease of cleaning.



### Internal cable glands

The innovative internal cable gland patented by BERNSTEIN guarantees maximum ease of cleaning. The optimised cable entry point makes it easy to wind up the cable, thus avoiding the risk of cable damage.



### Pivoted pedals

The new operating function ensures the operating force is transmitted from the pedal via the pivot pin directly to the switching element. Thanks to this innovative solution, which renders the actuating plunger between pedals and the base of the enclosure unnecessary, the pedals can be raised for ease of cleaning. In addition, the unique design makes it easier to change the individual pedals if need be.



### Modular design

The modular concept permits customers to configure switches to suit their specific requirements. With this new generation of medical foot-operated switches, BERNSTEIN offers comprehensive solutions ranging from the colour layout and inscription of the individual corporate design through technical details such as the use of analogue modules, covers or carrier handles to docking facilities for additional modules.



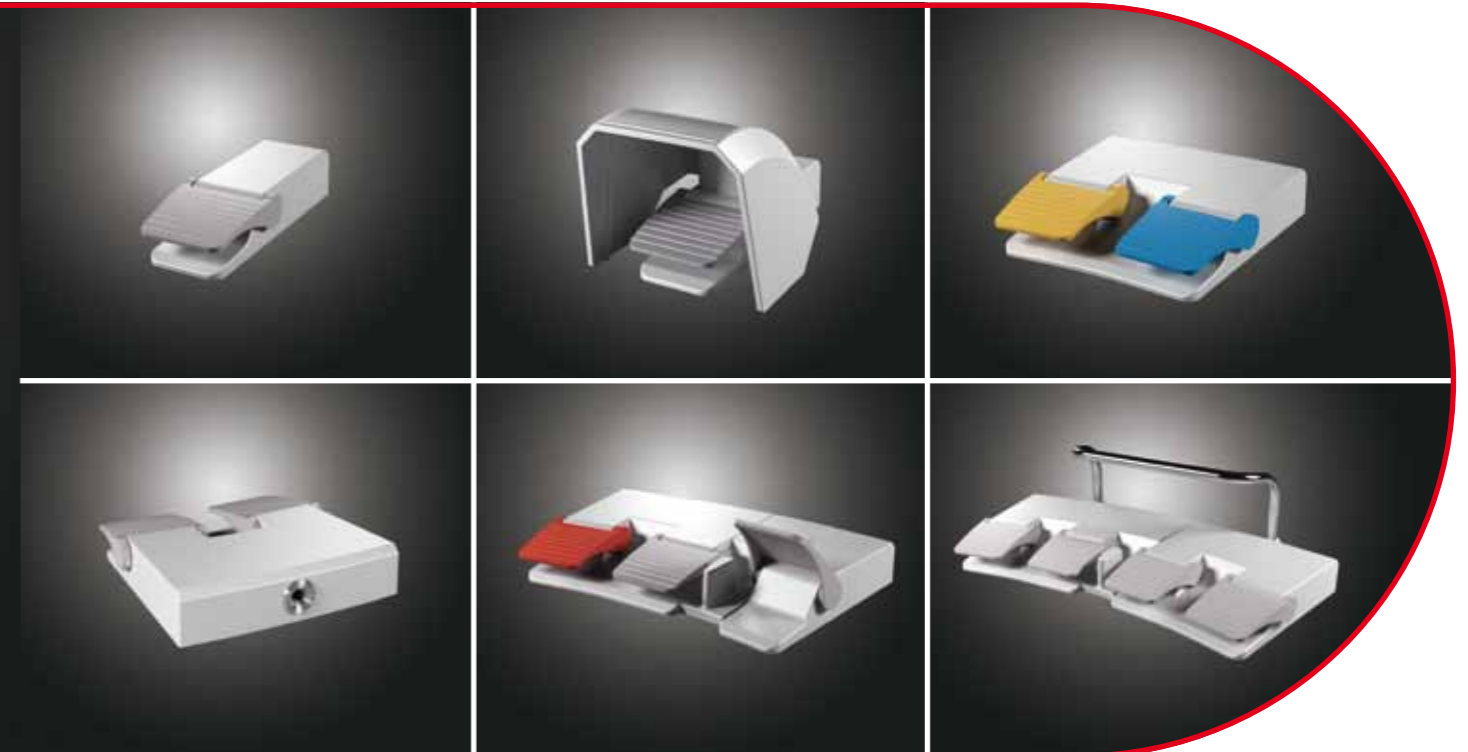
## The New Generation Medical Foot-Operated Switches MF1-4

Ergonomically designed and elegant –  
safe and easy to clean



## The New Generation Medical Foot-Operated Switches MF1-4

Varied solutions – consistently reliable



### Overview of product advantages

- Ergonomically optimises, elegant design
- Easy to clean
  - Homogeneous enclosure surfaces
  - No plunger mechanism – actuation integrated on pedal pivot pin
  - Internal cable gland
- Radial cable entry for effective cable protection
- Analogue or digital output signals
- Protected, internal cover seal
- Modular design allows customers to select individual configurations such as
  - Carrier handle
  - Analogue modules
  - Covered switches in various positions
  - Individual colour layout of enclosure and pedals
  - Laser engraving
  - Screen print labelling

### Technical Data

- Enclosure and cover: Aluminium pressure die-casting
- Actuating element: Foot pedal (PA)
- Contact type: Switch element, positive break / potentiometer
- Mechanical service life\*: >1 million switching operations
- Ambient temperature: -10 °C to +80 °C / short-term max. 2 h up to +95 °C
- Rated insulation voltage  $U_i$ : 400 V AC
- Conv. thermal current  $I_{the}$ : 10 A
- Utilization category: AC-15,  $U_e / I_e$  240 V/3 A
- Type of protection: IP67, optionally up to IPX8

\*see technical data sheet for details

# Foot-Operated Terminal FBT

# Modular Design

The individual modules can be positioned and combined individually corresponding to specific applications. Used as a sub-assembly in your device, machine or system you can effectively integrate the operating interface with the required switching functions.

## The result of common ideas

## Structured compatibility



With the modular foot-operated terminal **FBT**, BERNSTEIN has included a state-of-the-art medical foot switch in its product range that offers a unique spectrum of combination options while satisfying the requirements of all control applications.

Numerous high-quality standard components open up a wide range of switching options. The **FBT** has the high protection class IPX8, thus conforming to stringent hygiene requirements.

This is achieved by clear design, large surfaces, high-grade surface finish as well as sealing caps with external sealing edges for shielding switching modules, pedals and other possible options.

The **FBT was developed in cooperation with renowned medical equipment manufacturers.** It meets the special requirements of this sector and those of comparable fields such as the pharmaceutical or food processing industries.

Examples of module variants, other combinations available on request

Designation	Single pedal	Double pedal	Potentiometer	Joypad
<b>Microswitch*</b>	1 (S1) / 2 (S2)	1 (DS1) / 2 (DS2)	1 (P1)	1 (JP1) / 2 (JP2)
<b>FBM</b> Foot-operated module	● / ●	● / ●	●	● / ●
Foot-operated terminal <b>FBT1 (1 module)</b>	● / ●	● / ●	●	● / ●
Foot-operated terminal <b>FBT2 (2 modules)</b>	● / ●	● / ●	●	● / ●
Foot-operated terminal <b>FBT3 (3 modules)</b>	● / ●	● / ●	●	● / ●

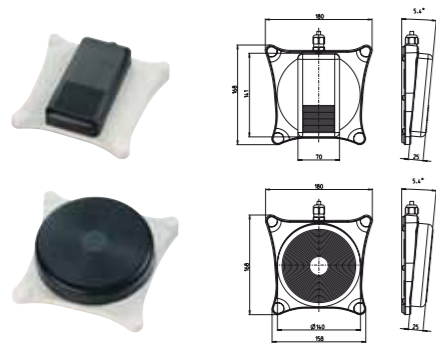
\*a maximum of 2 microswitches can be used at each ●

## Single-Pedal Foot-Operated Terminal FBT1

The single-pedal foot-operated terminal is a medical foot switch for laboratory and operating theatre applications. The switch consists of an ergonomically formed plastic front with stainless steel cover. Thanks to its special design, the foot-operated switch is extremely stable on the floor and can be easily guided with the foot when changing position. The terminal is particularly easy to clean as not only the electrical contacts but also the entire connection chamber corresponds to IPX8.

### Product features

- Optimum stability
- High mechanical durability
- 2-level switching possible
- Analogue or digital output signals
- Inscription according to customer requirements
- Freely selectable cable and plug



### Technical Data

- Enclosure: Plastic PP (polypropylene)
- Actuating element: Plastic with silicone rubber cover
- Contact type: 1 make contact
- Mechanical service life\*: >1 million switching operations
- Ambient temperature: 0 °C to +70 °C
- Rated insulation voltage  $U_i$ : 250 V
- Conv. thermal current  $I_{the}$ : 2 A
- Utilization category: AC-15, 250 V, 1 A; DC-13, 30 V, 1.5 A
- Type of protection: IPX8 conforming to EN 60529

\*see technical data sheet for details

## Multi-Pedal Foot-Operated Terminals FBT2 / FBT3 / FBT4

### Solutions for intuitive operation



## FBT2

The two-pedal foot-operated terminal is used in connection with shaver systems, radiology, HF surgery as well as laser and laboratory technology. The switch consists of a high-grade stainless steel base plate and a connection chamber cover.

The connection chamber provides space for individual electronics circuitry solutions. The FBT is extremely stable, easy to clean and can be clearly labelled. The medical foot-operated switch conforms to the high protection class IPX8.

**See next page for the extensive range of accessories**

## FBT3 / FBT4

Up to 26 switching functions can be realised with these operating units, thus offering the user a high degree of flexibility.

In both models, the extended connection chamber ensures effective accommodation of the electronics.

### Product features

- Modular pedal or joypad attachments
- Bar as footrest or for changing position
- Adjustable foot heights ensure the ideal ergonomic position
- High mechanical durability
- 2-level switching possible
- Centre and outer bars for pedal separation or lateral foot guide
- Switched centre bar
- Analogue or digital output signals
- Labelling or laser inscription according to customer requirements

### Technical Data

- Base plate: Stainless steel
- Actuating element: Plastic with silicone rubber cover
- Contact type: See technical data sheet for switch insert
- Mechanical service life\*: >1 million switching operations
- Ambient temperature: -10 °C to +80 °C
- Rated insulation voltage  $U_i$ : 250 V (III/2)
- Conv. thermal current  $I_{the}$ : 2 A
- Utilization category: AC-15, 250 V, 1 A; DC-13, 30 V, 1.5 A
- Type of protection: IPX8 conforming to EN 60529

\*see technical data sheet for details

## FBT – Foot-Operated Modules – Accessories

Based on a high-grade stainless steel base plate and the connection cover, your bespoke and ergonomic solution can be realised with an individual combination of switch modules, support feet and bars. All FBT2 and FBT3 foot-operated modules can be configured by the customer.

### Foot Bars

Two different bar lengths make it possible to physically separate the switch modules at the rear or over the entire area.



### Support feet

Support feet with different heights adjust the angle of the FBT to the ergonomically ideal position for the user.



### Carrier bar

For conveniently carrying the FBT from one position to the other.



### Centre bar switch

The use of a switched centre bar provides an additional operating function.



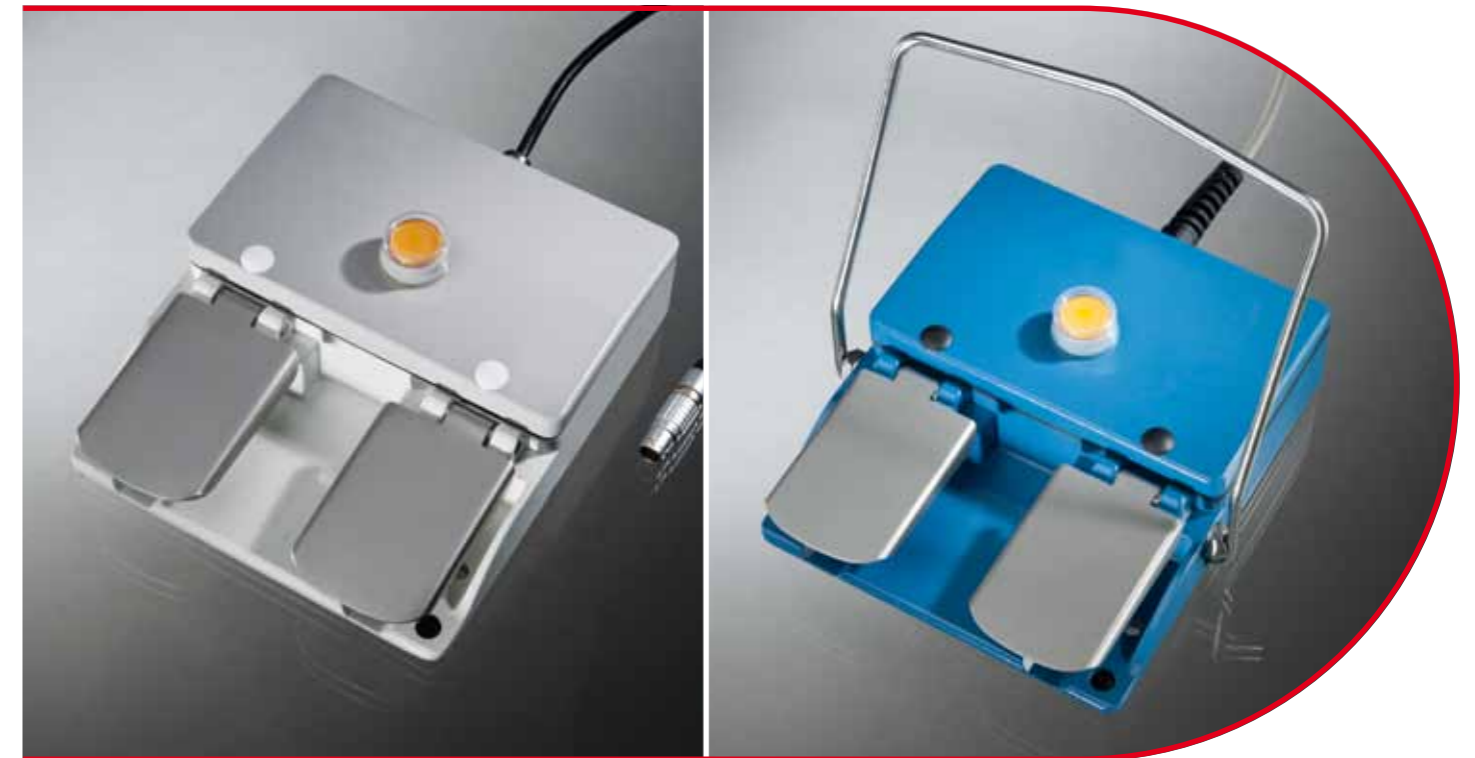
### Sealing caps

Stamp your individuality on "your" FBT by selecting coloured caps and individual laser inscription or screen print.



## Aluminium Pressure Die-Cast Medical Foot-Operated Switches F1, F2

With our extensive expertise, we can assist you in the development of solutions for more efficient use of your medical equipment. You can choose from our tried and tested range of aluminium pressure die-cast products. Our products combine the best possible solutions with familiar design. Thanks to the stainless steel pedals based on an individual design layout we are also able to configure technically intricate customer solutions.



### Product features

- High mechanical durability
- Stainless steel or plastic pedals
- Selection of different pressure points
- Analogue module with 2 additional switches
- Analogue or digital output signals
- EMC and ATEX screw connection
- Cable/plug connection according to customer requirements
- Protective hood
- Folding stainless steel bar
- AP Class
- Customised paint finish/screen print labelling

### Technical Data

- Enclosure and cover: Aluminium pressure die-casting
- Actuating element: Foot pedal (PA)
- Contact type: Switch element, positive break / potentiometer
- Mechanical service life: 10 million switching operations
- Ambient temperature: -30 °C to +80 °C / short-term max. 2 h up to +95 °C
- Rated insulation voltage  $U_i$  400 V AC
- Conv. thermal current  $I_{the}$ : 10 A
- Utilization category: AC-15,  $U_e / I_e$  240 V/3 A
- Type of protection IP67, optionally up to IPX8



**Switch technology –  
Economy meets safety**



**Sensor technology –  
Compact intelligence**



**Enclosure technology –  
Function and design**

[www.bernstein.eu](http://www.bernstein.eu)

## Contact

**International Headquarters  
BERNSTEIN AG**  
Tieloser Weg 6  
32457 Porta Westfalica  
Phone +49 571 793-0  
Fax +49 571 793-555  
info@de.bernstein.eu  
www.bernstein.eu

**Denmark  
BERNSTEIN A/S**  
Phone +45 7020 0522  
Fax +45 7020 0177  
info@dk.bernstein.eu

**France  
BERNSTEIN S.A.R.L.**  
Phone +33 1 64 66 32 50  
Fax +33 1 64 66 10 02  
info@fr.bernstein.eu

**Italy  
BERNSTEIN S.r.l.**  
Phone +39 035 4549037  
Fax +39 035 4549647  
info@it.bernstein.eu

**United Kingdom  
BERNSTEIN Ltd**  
Phone +44 1922 744999  
Fax +44 1922 457555  
info@uk.bernstein.eu

**Austria  
BERNSTEIN GmbH**  
Phone +43 2256 62070-0  
Fax +43 2256 62618  
info@at.bernstein.eu

**Switzerland  
BERNSTEIN (Schweiz) AG**  
Phone +41 44 775 71-71  
Fax +41 44 775 71-72  
info@ch.bernstein.eu

**Hungary  
BERNSTEIN Kft.**  
Phone +36 1 4342295  
Fax +36 1 4342299  
info@hu.bernstein.eu

**China  
BERNSTEIN Safe Solutions  
(Taicang) Co., Ltd.**  
Phone +86 512 81608180  
Fax +86 512 81608181  
info@bernstein-safesolutions.cn

**Service Hotlines:**  
For products: +49 571 793-3000  
For orders: +49 571 793-3010

Customer	Customer No.	Phone
Address		Fax
Contact partner	Department	
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<input type="checkbox"/> Sample	Annual requirement	
<input type="checkbox"/> Order	Delivery date	

Foot switch application (short description of application):

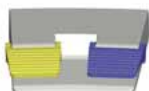
## 1 Number of pedals

### MF1



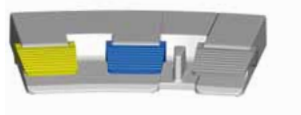
1 Pedal

### MF2



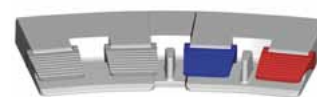
2 Pedals

### MF3



3 Pedals

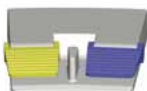
### MF4



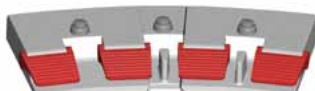
4 Pedals

## 2 Separator

(between the pedals on multi-pedal versions, the connecting piece always comes with a separator)



MF2



MF4

None

## 3 Pedal colour

### Pedal 1

- Grey (RAL 7036)
- Yellow (RAL 1004)
- Blue (RAL 5015)
- Red (RAL 3000)

### Pedal 2

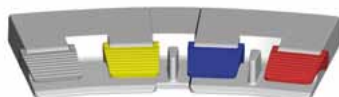
- Grey (RAL 7036)
- Yellow (RAL 1004)
- Blue (RAL 5015)
- Red (RAL 3000)

### Pedal 3

- Grey (RAL 7036)
- Yellow (RAL 1004)
- Blue (RAL 5015)
- Red (RAL 3000)

### Pedal 4

- Grey (RAL 7036)
- Yellow (RAL 1004)
- Blue (RAL 5015)
- Red (RAL 3000)

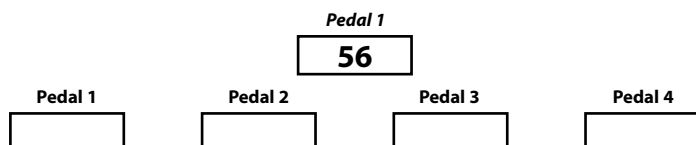


Other

## 4 Contact configuration

Up to 2 flush-mounted switches or one analogue module can be installed per pedal. An internal pressure point (30N) is also available. It is additionally possible to have a cover button between the pedals on multi-pedal versions.

**Example:** Pedal 1: 1x changeover contact (snap-action) + 2x NC contact (snap-action)



## Code – contact configuration

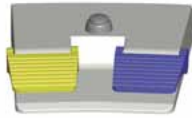
- 0 = No contact
- 1 = Changeover contact 1NC/1NO (slow-action)
- 2 = Normally closed contact 2NC (slow-action)
- 3 = Normally open contact 2NO (slow-action)
- 4 = Changeover contact 1NC/1NO overlapping (slow-action)
- 5 = Changeover contact 1NC/1NO (snap-action)
- 6 = Normally closed contact 2NC (snap-action)
- 7 = Normally open contact 2NO (snap-action)
- A = Potentiometer contact block with max. 2 No. 5 changeover contacts 1NC/1NO (snap-action)

### 5 Analogue module

- 2 kOhm
  5 kOhm
  10 kOhm
  None

### 6 Cover button

Cover button with 2x microswitch (1NC/1NO)

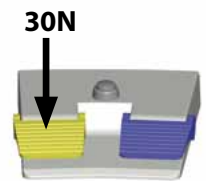


- Centre
  Left  Right
  Left  Centre  Right
  None
- MF2**
                 
 **MF3 MF3**
                 
 **MF4 MF4 MF4**

### 7 Internal pressure point (30 N)

Separates two flush-mounted switches

- MF1
  MF2 Pedal 1
  MF3 Pedal 1
  MF4 Pedal 1
  None
- MF2 Pedal 2
  MF3 Pedal 2
  MF4 Pedal 2
- MF3 Pedal 3
  MF4 Pedal 3
- MF4 Pedal 4



### 8 Internal cable gland

As from Type MF2

- Clamping range ø 3-7 mm
  Clamping range ø 6-12 mm
  None



### 9 Shield support

- With
  Without

### 10 Hood

Only for MF1-2



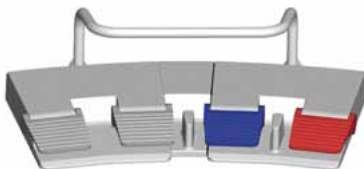
MF1



MF2

Without

### 11 Folding bar



- MF1
  MF2
  MF3
  MF4
  Without

### 12 Fixed bar

Only for MF1-2

- MF1
  MF2
  Without

*Available as from 4th quarter 2010*