



## KLS Martin Argon Beamer System MB 181

### Operating Instructions

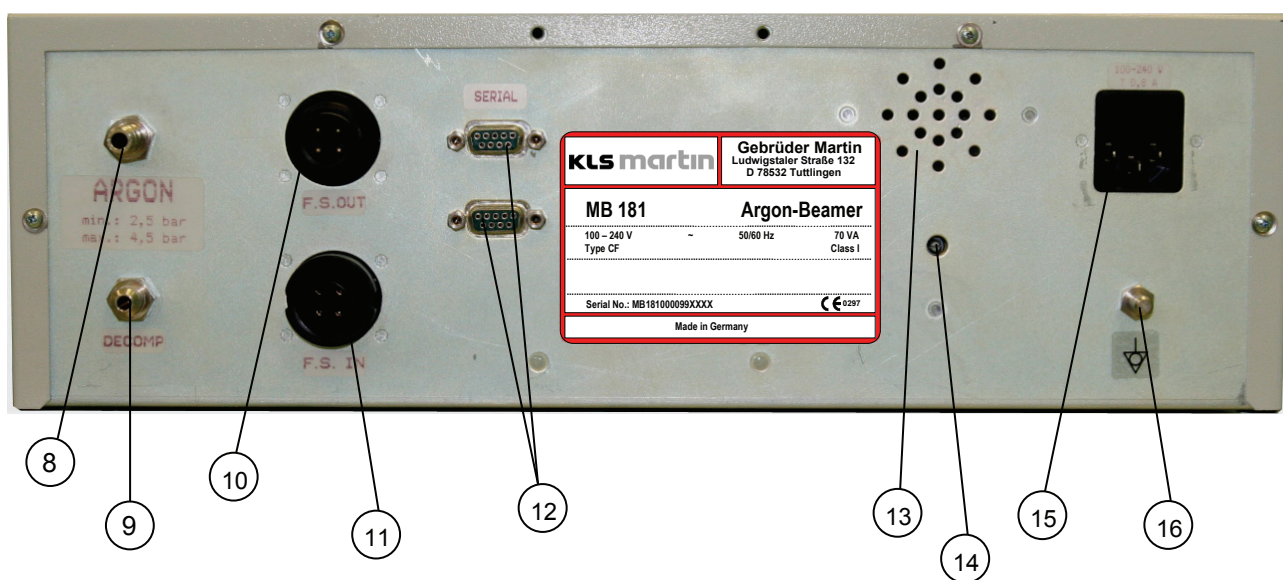
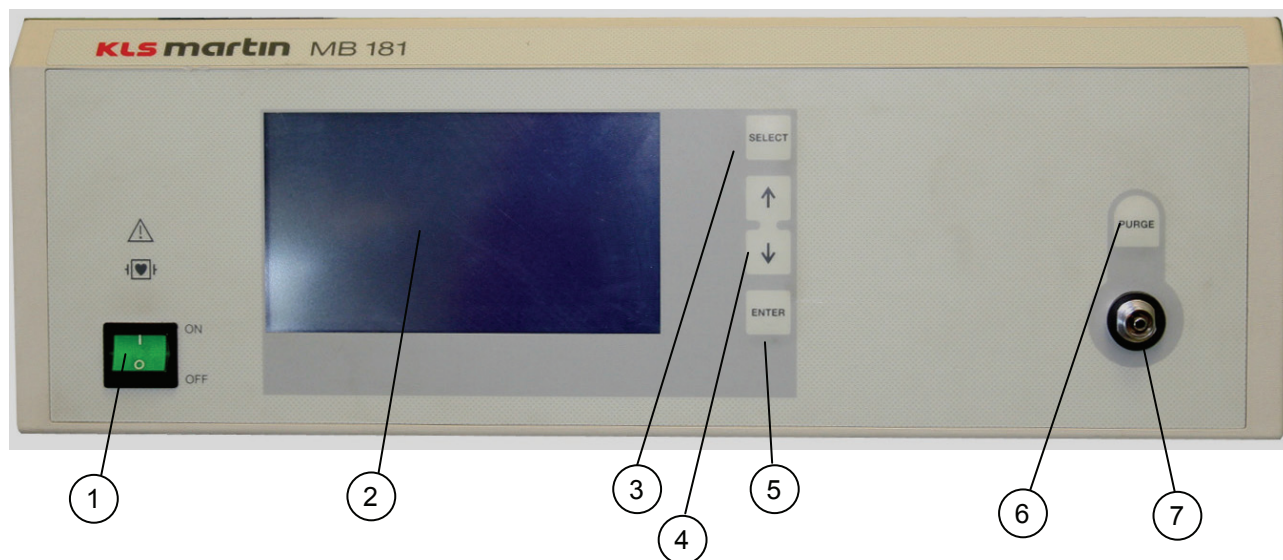
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# 1 Start-Up

## 1.1 Controls, Displays & Indicators and Connections



- 1 POWER switch
- 2 Screen
- 3 SELECT button for selecting a menu field
- 4 Up/down buttons ↑ and ↓ for changing/selecting a value or moving through a submenu
- 5 ENTER button for accessing a submenu or returning to the main menu
- 6 PURGE button for purging the applicator with argon gas
- 7 Applicator gas connector jack
- 8 Argon gas-supply connector
- 9 Decompression stud
- 10 Foot switch signal cable connector socket (for connection to HF surgical unit)
- 11 Foot switch connector socket
- 12 Connector sockets for serial connecting cables
- 13 Loudspeaker for activation signal
- 14 Volume control
- 15 Mains connector (socket plus line fuses)
- 16 PE (potential equalization) connector



CF type of protection; defibrillator-proof



Observe Operating Instructions!

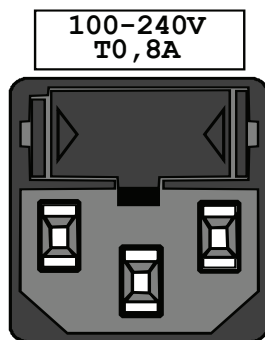
## 2 Setting Up the Unit

### 2.1 Connecting to the Mains

The MABS generator MB 181 must be connected to a supply system with a nominal mains voltage of 100 V to 240 V. For this, connect the power cord supplied to the mains connector socket (15).

If the system has been installed on a MABS trolley, the trolley power cord must be plugged into the mains connector socket (15).

The mains connector socket assembly also contains the line fuses (2 pieces, 0.8 A, slow-blowing).



### 2.2 Gas Supply

The inert gas argon is required for operating the MABS generator MB 181. This gas is delivered in cylinders of various sizes at a nominal filling pressure of 200 bar. Gebrüder Martin recommends using exchangeable 10-l cylinders filled with "quality 4.8" argon gas (which has a purity higher than 99.998%). This is equivalent to 2,000 l in terms of atmospheric pressure (i.e. expanded) and will be sufficient for 6 to 8 hours of activation. The cylinder must be connected to the gas inlet connector located on the unit's rear panel.



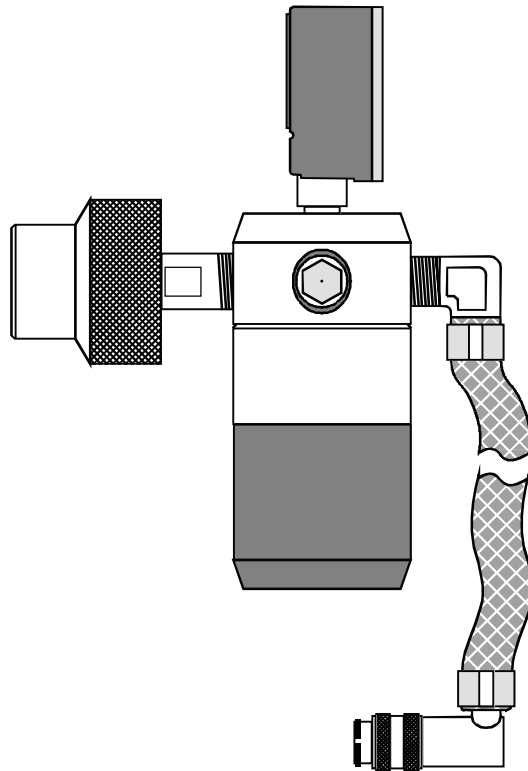
The high pressure is reduced to a level of 2.5 to 4.0 bar by means of the pressure reducer provided as a standard accessory. Before connecting the pressure reducer to the cylinder, however, be sure to set up the cylinder safely and securely in accordance with the operating and safety rules dealing with the use of pressure vessels. If the MB 181 is installed on a MABS trolley, up to two gas cylinders can be securely installed with the help of two safety belts. Following secure installation, the protective cap on the non-return valve can be removed and the

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pressure reducer screwed on. Just "finger-tighten" the knurled screw (do not use excessive force).

### **Do not use force or tools when tightening the screw!**

Only now may the (angle-type) non-return valve of the pressure cylinder be opened (rotating it counterclockwise by at least a half turn). The filling level can be checked by means of the pressure indicated on the manometer of the MABS pressure reducer.



The hose fitted to the MABS pressure reducer features a quick-action coupling for push-on connection to the gas supply stud of the MB 181 (clicks home). This coupling incorporates a locking mechanism which automatically seals the outlet when disconnecting the hose from the stud, thus ensuring that no gas will flow out. If the hose has already been pressurized, comparatively more force is required when connecting it (compared to the unpressurized condition) and a small amount of gas will escape during this process.

To exchange gas cylinders, the pressure reducer must be disconnected from the empty bottle after shutting off the non-return valve. However, this is only possible when the pressure reducer has been depressurized. To do this, a gas flow can be generated (either by activating the MB 181 or operating the PURGE button). However, a better and faster way consists in just disconnecting the quick-action coupling and pushing it onto the decompression stud located on the unit's rear panel.



**Never use up all of the gas contained in a gas cylinder!**

As a rule, cylinders should be replaced when the cylinder pressure falls below 30 bar.

**If the system is not used for an extended period of time, the non-return valve on the cylinder should be closed.**



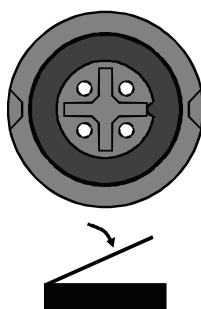
**Safety and proper operation of the MABS generator MB 181 is ensured only on use of the genuine MABS pressure reducer.**

**Pressure reducers other than that MABS pressure reducer provided by Gebrüder Martin as standard accessory (see item 6) shall not be connected to the system!**

## 2.3 Connecting the Foot Switch

The monopolar dual-pedal foot switch – which normally is connected to the HF surgical unit – can also be connected to the socket (11) located on the system's rear panel. In this set-up, the foot switch activation signals are transmitted to the HF surgical unit via the MB 181 (master-slave operation). This ensures that both systems are activated at the same time.

If the MB 181 remains switched off, the system automatically provides for a direct connection between the foot switch connector socket (11) and the foot switch signal cable connector socket (10). Consequently, there is no need to switch sockets (i.e. connect the foot switch to the HF unit) when the HF unit is used without the MABS system, provided the MABS foot switch signal cable has been properly connected to socket (10) on the one hand and to the HF unit's foot switch socket on the other hand. When the MB 181 is in use, foot switch signal transmission of course presupposes fault-free operating conditions (no error messages). If a serial signal cable is used for connection to the HF surgical unit, the signal transfer to socket (10) will be blocked.



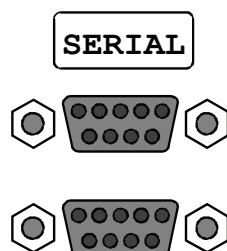
## 2.4 Connecting the MB 181 to the HF Surgical Unit

### 2.4.1 Using a serial interface cable for connection

If the MB 181 is to be operated with a KLS Martin HF surgical unit **featuring** a serial signal socket, the serial interface cable must be used for connecting the MB 181 to the HF unit.

Cannot be used with the maxium®!

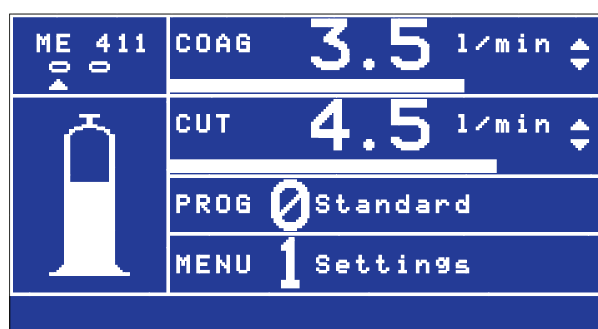




For this, connect the serial interface cable to the socket marked "SERIAL" on the KLS Martin HF surgical unit and to one of the two sockets (12) on the MB 181 (which are likewise marked "SERIAL"). If made correctly, this connection is automatically recognized by both systems and the HF unit automatically adjusts itself to MABS mode. On the MB 181, this mode of operation is indicated by displaying the model name of the KLS Martin HF unit in the upper left corner of the screen.

**It is to be noted that, in this set-up, the spray type coagulation needs not to be set on the HF unit ME 411 because the HF system automatically switches over to spray coagulation whenever monopolar coagulation is activated, switching back again to the previously selected type of coagulation as soon as the activation phase is terminated.**

This has the advantage that a second electrode handle (if connected to the HF surgical unit) can be used with a different mode of coagulation without any need for the user to switch over manually on the HF unit when alternating between argon-assisted coagulation and conventional coagulation.



With the HF surgical unit ME 411 with its two monopolar outputs, the user can select, with the help of the "Settings" menu item, the preferred one from which he/she wants to have the HF current supplied to the MABS handle in this connection setup. The selected output is then marked by an arrow in the upper left screen section. The MB 181 comes factory-preset in such a way that the HF current for the MABS handle will be supplied by that monopolar HF output of the ME 411 which can **not** be activated via the foot switch. With the ME 411, this is the left monopolar HF output. So the second output may be used for connecting another conventional HF surgical instrument which can only be activated by the foot switch.

If required, this setting may be changed to the other HF output according to the procedure explained in item 3.6.

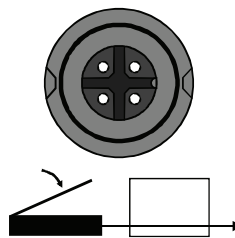
With the ME CD1, the output to which the MABS handle shall be connected has to be selected at the ME CD1 and it is to be set in the argon beamer operation mode.

**Note that only with this connection set-up it is possible to activate the systems with the finger switches provided on the applicator.**

However, foot switch activation of the ME 411 is also possible with the foot switch connected to the MB 181 unit. If the MB 181 is set in the way that the applicator is to be connected to right the output of the ME 411 which may also be activated by foot switch, then the foot switch may be connected either to the ME 411 or to the MB 181 to activate both of the units simultaneously. With the ME CD1, it has to be connected to the electrosurgery unit and must be allocated to the HF output where the MABS handle is connected to.

#### 2.4.2 Using the foot switch signal cable for connection

When using a KLS Martin HF surgical unit which does **not** incorporate a SERIAL connector socket, the activation signals emitted by the foot switch connected to the MB 181 must be passed on to the HF unit for simultaneous activation (master-slave operation). For this, the foot switch signal cable must be connected to the output connector socket (10) on the rear panel of the MB 181 and to the HF unit's monopolar foot switch connector socket. Upon operating a foot switch pedal, the signal is then transmitted from the MB 181 to the HF unit via this cable, provided no error situation is present.



If the MB 181 remains switched off, the foot switch signals are automatically and directly transmitted from socket (11) to socket (10). In this way, the HF unit can be activated with the foot switch even though the MB 181 is not being used. In other words, there is no need to plug the foot switch connecting cable into a different socket (i.e. the one on the HF unit).

**Note that in this connection setup it is not possible to activate the MB 181 with the finger switches provided on the applicator! Moreover, the "spray coagulation" mode of operation is not set automatically on the HF unit and must therefore be selected manually. Having an electrosurgical generator with more than one monopolar HF output, the applicator is to be connected to that output which can be activated by foot switch.**

### **2.4.3 Operating the MB 181 in conjunction with third-party HF surgical units**

Basically, the KLS Martin MB 181 and its applicators can be used with any HF surgical device that complies with the following three criteria:

1. Availability of a "spray coagulation" mode of operation with an output power of at least 50 W.
2. Possibility to connect a monopolar flat connector (US three-pin plug) to a monopolar output socket which can be activated with the foot switch (using an adapter if required).
3. Availability of a foot switch connector socket to which the monopolar KLS Martin foot switch can be connected. If the connector pin assignment differs from KLS Martin's, this can be corrected by means of switches inside the unit.

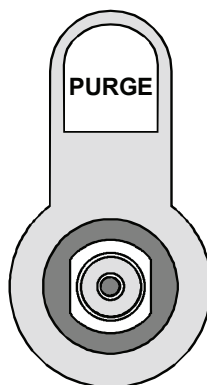
If in doubt, please contact your specialized dealer!

## **2.5 Connecting MABS Handles**

The MABS handles for argon-supported cutting and/or coagulating have separate connections for HF current and gas supply. Usually, the flat connector of the HF current connecting cable is plugged into that monopolar output of the HF unit which can also be activated with the foot switch. If the two units are connected to each other with a serial interface cable, then the other monopolar output may be used alternatively, provided the appropriate setting has been selected on the MB 181 (see section 2.4.1).

The gas supply connection is a common Luer-lock connector that must be connected to the jack (7) located on the front panel. The "PURGE" button allows generating an argon gas flow in order to blow the air out of the applicator without activating the HF unit.

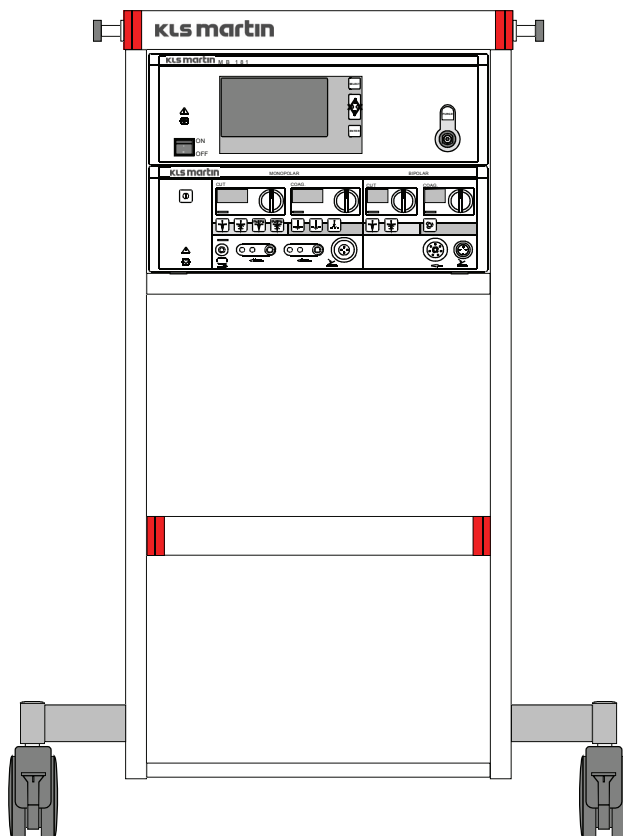
The components of the gas supply system and the gas flow control system inside the unit are unsterile up to the applicator connector socket. To ensure better protection against germinal contamination, a (disposable) sterile micro-filter with a pore size of 0.2 µm can be installed between the output jack and the sterilized applicator in order to keep the applicator germ-free (though not virus-free).



## 2.6 Installing the MB 181 on a Trolley

In order to have the entire MABS system (comprising the MB 181, the HF surgical unit and the argon gas cylinders and their accessories) available as a self-contained unit, we recommend using the MABS trolley. If the MB 181 is used in conjunction with a KLS Martin HF surgical unit, it is best to install the two devices on top of each other. As the shelves are slightly inclined towards the back and have a bordered rear edge, the units can be safely stored without any further fastening or fixation.

In the rear part of the trolley, one or two argon gas cylinders can be securely installed. When inserting the cylinders, take care that the manometer of the pressure reducer can be easily checked from the outside. The protective cap of the cylinder can be stored on the trolley's bottom shelf next to the cylinder.



## 3 Setting & Operating the MB 181

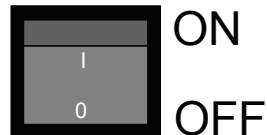
### 3.1 Switching on the MB 181

The system can be switched on and off with the POWER switch (1) located on the front panel.

Upon switching on, the system carries out a self-test which takes about 15 seconds. During this period, no parameter setting is possible yet. If the foot switch connected to the MB 181 goes into operation as soon as the unit is switched on, an error message will be displayed because the system interprets this operating condition as either a foot switch- or system-related

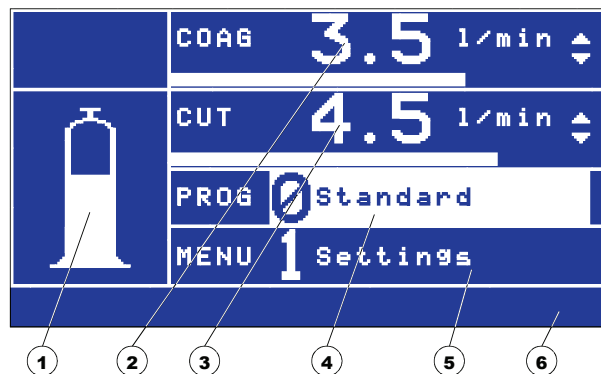
defect. Once the self-testing routine ends, an acknowledgement signal must be audible and the main menu must be displayed on the screen. Otherwise, it is not possible to set the system and activate it.

If the "Input pressure too low" message is displayed instead, either no gas cylinder is connected or the non-return valve on the argon gas cylinder is still closed.



### 3.2 Main Menu

Upon completion of the system test, the following information will be displayed on the screen if everything is O.K. This screen comprises six display or control fields.



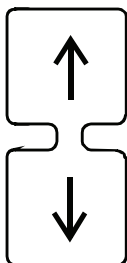
- 1 Argon gas supply status
- 2 Gas flow rate for coagulation
- 3 Gas flow rate for cutting
- 4 Currently selected program
- 5 Menu/submenu level
- 6 Display field for alerts and error messages

### 3.3 Menu Control Buttons

With the operator buttons next to the screen, settings can be selected and changed. These four buttons have the following functions:



**SELECT button:** This key is used for selecting a menu field in order to change the setting or access a submenu. Accordingly, it is only possible to select fields which allow either a parameter or menu change. In the main menu, this applies to the following fields: COAG, CUT, PROG, and MENU. The currently selected field is always displayed inversely; the inverse display mode thus functions as a cursor. Upon switching on the unit, the "PROG" field (main menu) is always highlighted automatically so the user can easily select the program of his/her choice. By pressing the SELECT button repeatedly, the "cursor" cycles from field to field in the order shown above.



In the main menu, the Up/Down buttons (↑ and ↓) are used for setting adjustable values such as the gas flow rate or the number of the desired program.

In the submenus (each one consisting of several lines), the Up/Down buttons ↑ and ↓ are used to move from line to line. When a field has been activated with the SELECT button, pressing these keys then increases or decreases the value displayed by one increment. Upon reaching the upper or lower setting limit, either a signal is heard (e.g. upon reaching the values "0" and "12" when setting the gas flow rate) and no action occurs, or the count continues on the other end (e.g. program 9 is followed by program 0), which means that the counting is done in a closed circle.



The ENTER button is used for changing the menu level (i.e. accessing a submenu or returning to the main menu). In the main menu, a submenu can be called up in the case of the PROG and MENU fields. In a submenu, pressing the ENTER button returns the user directly to the main menu.

### 3.4 Setting and Activating the Gas Flow

In order to change the coagulation or cutting gas flow rate setting, the corresponding field must first be selected/activated with the SELECT button. Alternatively, it is also possible to activate the respective function for a short time by operating the foot switch; this also allows selecting the desired field. The ↑ or ↓ button can then be used to change the setting as desired.

The gas flow rate value can be set in steps over a range of 0 to 12 liters per minute, with fixed (automatic) increments as follows:

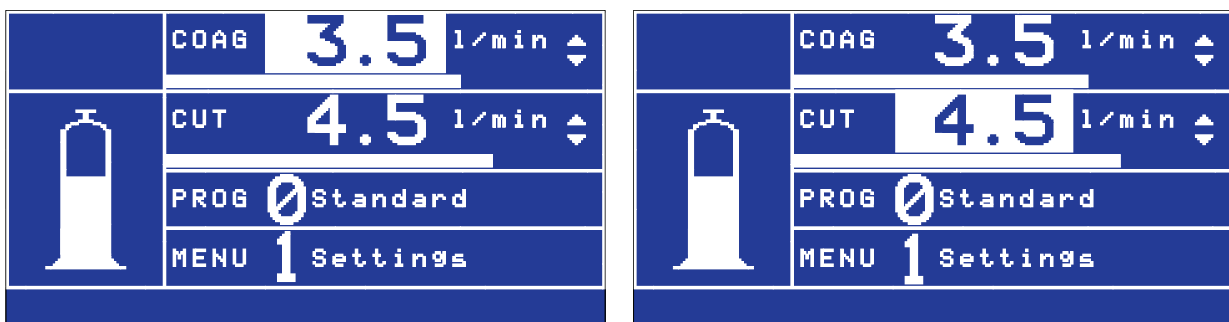
0.0 l/min - 1.0 l/min: in increments of 0.1 l/min

1.0 l/min - 3.0 l/min: in increments of 0.2 l/min

3.0 l/min - 5.0 l/min: in increments of 0.5 l/min

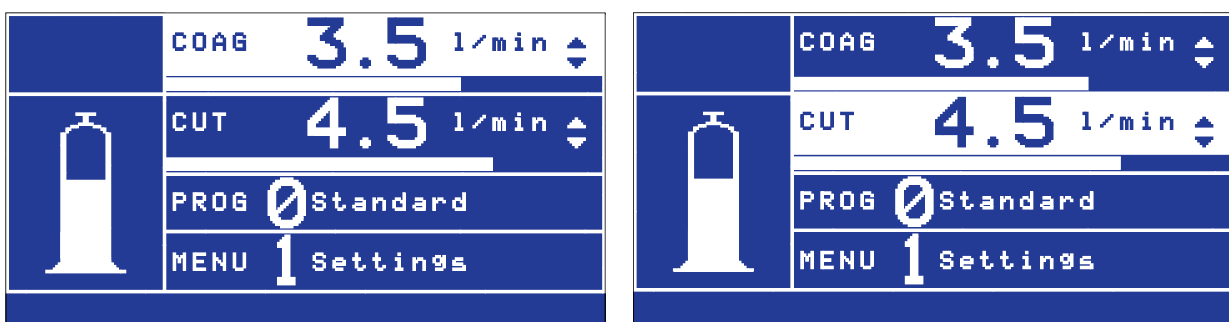
5.0 l/min - 12.0 l/min: in increments of 1.0 l/min

At the bottom of the CUT and COAG display fields, a horizontal bar is shown whose length represents the set gas flow rate. However, this length corresponds to the effect that is to be expected (and thus the subjectively perceived dose) rather than the numerical value of the set gas flow rate.



If the coagulation or cutting function is activated, the corresponding menu field (i.e. all of it) is displayed inversely and an activation signal is sounded. During activation, the gas flow rate can be adjusted with the ↑ or ↓ button if required, while the SELECT and ENTER buttons are inactive (function blocked) in the main menu in this case. Activation is also possible, however, when a submenu has been called up.

Upon termination of the activation, the set numerical value is retained in inverse display and can therefore be changed, if desired, with the ↑ or ↓ button. All the other sections of the field return to normal (non-inverse) display.

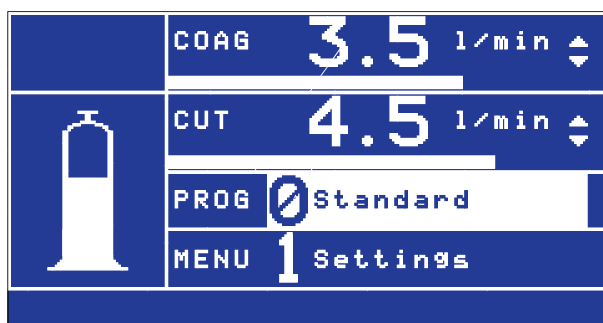


### 3.5 Assigning Settings to Storage Positions

The MB 181 allows to store up to 10 settings, which can be assigned to storage positions 0 to 9. These positions can also be identified with customized plain-text designations, to be entered by the user.

Calling a stored program/setting is done as follows: First, activate the PROG field by using the SELECT button. Then, use the ↑ or ↓ button to select the desired program number. Along with the selected number, the corresponding settings will also be displayed in the COAG and CUT fields, together with the plain text for the program (provided one has been assigned). If the gas flow values are changed in the COAG and/or CUT fields, then this setting keeps valid until an other program will be recalled or the unit will be switched off. After power-on or in case of a repeated recall of this program, the former setting will be re-established. If the new setting is intended to be a permanent replacement for the former setting, then the ENTER key has to be pushed **and kept to be pushed** for 3 Seconds until an acoustic occurs.

Upon switching on the unit, the program used last will be valid.



After selecting the PROG field, pressing the ENTER button shortly will open a submenu.

Like in the main menu, the ↑ and ↓ buttons can now be used to cycle through the programs P0...P9 for selecting one of them. This submenu is particularly useful if the user wants to obtain an overview of all the customized settings already available. The currently selected program is displayed inversely (just like in the main menu).

	PROG	CUT	COAG
P	Program	0.0	0.0
P0	Program	0.0	0.0
P1	Program	0.0	0.0
P2	Program	0.0	0.0
P3	Program	0.0	0.0
P4	Program	0.0	0.0
P5	Program	0.0	0.0
P6	Program	0.0	0.0
P7	Program	0.0	0.0
P8	Program	0.0	0.0
P9	Program	0.0	0.0
P0	Standard	4.5	0.0

To storage positions P0 to P6, plain-text names and specific settings have already been preassigned in the factory. Note, however, that these settings are only recommendations. The user can of course change or completely overwrite them at any time!

To reassign or overwrite a storage position, first select the position by using the ↑ or ↓ button.

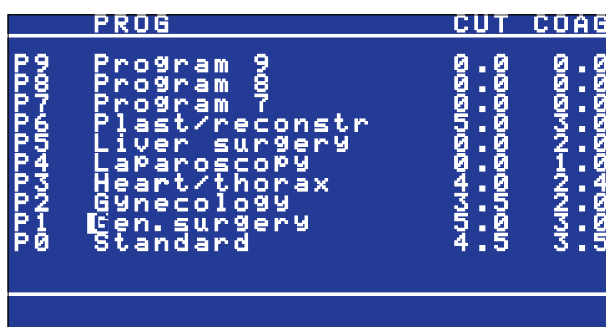


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In the example given here, we want to change the P1 program, giving it a new name and new settings. For this, we need to press the ↑ button just once.



We now use the SELECT button. Pressing it once brings the cursor to the first letter of the plain-text designation. The ↑ and ↓ buttons can now be used to work one's way through a character set containing capital and lower-case letters along with a number of punctuation characters and the space character.



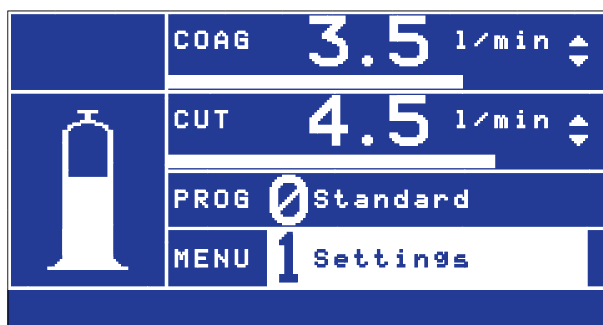
When the desired character has been reached, pressing SELECT moves the cursor to the next letter of the word to be changed or entered. In this way, a setting/program can be named as desired. Note, however, that these designations are limited to a maximum of 14 characters (spaces included). If required, use suitable acronyms or abbreviations. When replacing names, any remaining letters of the old name should be deleted by overwriting them with a space character.



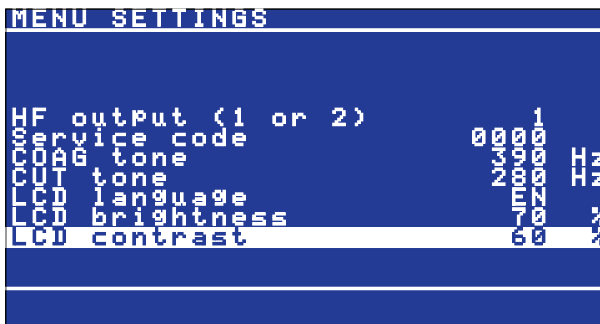
At the end of the name field, the cursor will jump to the CUT gas flow field upon pressing the SELECT button. Here, the CUT gas flow rate value can be changed with the ↑ and ↓ buttons as appropriate and in the same manner as in the main menu and will be kept stored permanently.

[illegible]

To access the submenu where the internal settings have been stored, proceed as follows: In the main menu, highlight the MENU field with the SELECT button, then select the “Settings” menu item by using the ↑ or ↓ button and press ENTER. You now are in the internal-settings submenu. This submenu also allows you to access the service level of the MB 181. To select the desired menu item, use the ↑ or ↓ button. Operating the SELECT button then moves the cursor to the adjustable parameter of the selected line. The value can now be changed as required by using the ↑ and ↓ buttons.



**Contrast:** Sets the electric working point of the LCD screen. The optimum value depends not only on the user's viewing angle but also on the ambient temperature. Particularly when the system has been moved to another location with a different room temperature, it may be necessary to readjust and optimize this setting. The same applies if the unit has been repositioned or set up anew and the viewing angle has been changed.



**Brightness:** Sets the light intensity of the screen. The primary light source of the screen is a fluorescent lamp subject to normal wear and tear. This means that the useful life of this lamp depends on the selected brightness level: the higher the brightness, the shorter the lamp's life. If the lamp cannot be ignited any more, the screen will remain dark and the lamp must be replaced.

**Language:** The MB 181 can display all of the screen terms and messages – at the user's option – either in German, English, French, Italian or Spanish. With regard to the program names, however, this only works as long as none of these names has been changed. If a change has been made, the program names are no longer "translated" when another language is selected.

**Tone (audible signal):** Upon activation or when an alarm is triggered, the MB 181 generates audible signals. In the two operating modes, COAG and CUT, the system works fully in parallel with the HF surgical unit, which likewise emits acoustic activation signals. To harmonize these signals, their frequency can be adjusted to each other. It is also possible to deactivate the activation signal by setting the frequency to "0". The loudness of the signal has been set to a fixed level and can only be changed via the setscrew located on the rear panel, but a tool is required for this.

**Service code:** This menu item allows access to additional functions relevant only for the initial startup and when the system needs servicing. To activate the various service functions, a numerical value must be entered (similar to a combination lock). This should prevent accidental changes of the basic settings which – if altered – are difficult to restore.

**HF output:** If, via the serial interface cable, the MB 181 has been connected to a KLS Martin HF surgical unit ME 411, this submenu item allows the user to select the output to which the applicator is to be connected. If there is no connection to such an HF unit, this item will not appear in the menu. The (standard) HF output selected for the factory-preset basic setting is the one that can **not** be activated with the foot switch. This setting may be useful if the HF unit's output which can be activated by the foot switch is required for connecting a conventional monopolar instrument that can only be activated with a foot switch. For a MABS instrument that likewise can only be activated by a foot switch, a second foot switch can then be used and connected to the MB 181 (see also section 2.4.1).

### 3.7 Time and Date

In the background, the MB 181 records all operational data and stores it in a non-volatile memory. For this purpose, an internal calendar clock is used, which controls the time and date. When

the unit is switched off, this clock is supplied by a battery. To access this submenu, first select the MENU field with the SELECT button, then select the menu item 2 ("Clock and date") with the ↑ and ↓ buttons. The date must be entered in the "day-month-year" format; the time must be entered in the "hour : minute" 24-hour format. To do this, first set the white bar on either the date or the time line (as appropriate) by using the ↑ or ↓ button. Then use the SELECT and ↑ and ↓ buttons in order to set the values in the manner described in section 3.5.



### 3.8 Maintaining a Session Log

The MB 181 records all important operating data of the last 10 sessions. The term "session" designates the time period between switching the unit on and off. The data pertinent to the current session is shown in the top line but is not being updated when this submenu has been opened. All previous session data is shifted to the bottom line by line. The bottom line (oldest session stored) is deleted whenever a new session is opened (and a new line added at the top).

To view the session log, select the MENU field in the main menu, using the SELECT button, then use the ↑ and ↓ buttons to select the "Sessions" menu item. Upon pressing ENTER, the session log is indicated. Pressing ENTER once again returns the user to the main menu.



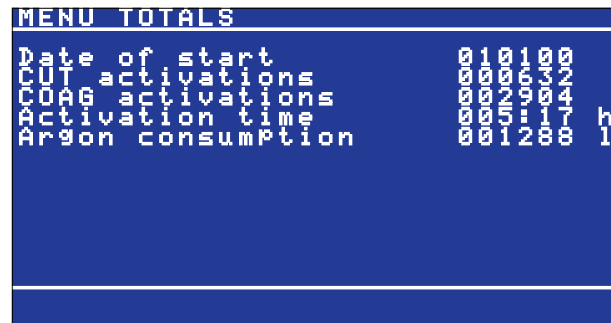
The following data is shown in the various columns of the log:

- Dat.: Shows the session date.
- Start: Shows the time when the session began.
- nCT: Shows the number of CUT activations.
- nCG: Shows the number of COAG activations.
- Sec.: Overall activation time in seconds.
- Ltr.: Liters of argon consumed during the session.

### 3.9 Totals

The MB 181 records the number of CUT and COAG current activations as well as total activation time and argon gas consumption since putting the unit into service. The start-up date is shown in the first/top line and is automatically entered when the internal clock is set for the first time. The data of the current session is not included yet in the totals shown.

To enter this submenu, first use SELECT to highlight the MENU field in the main menu, then select menu item 4, "Totals", by using the ↑ or ↓ button. Now press ENTER to have the totals displayed. Pressing ENTER once again returns the user to the main menu.



## 4 Safety Measures

### 4.1 Intended Use

The KLS Martin Argon Beamer System MB 181 is a gas flow controller for generating a defined gas flow in the range of 0 l/min to 12 l/min. The system is used in connection with an electro-surgical unit. The gas flow is activated simultaneously with the high-frequency current. Two different gas flow rates can be set, one for cutting and one for coagulating. The gas flow and the current meet in the patient-side part of the applicator. The working gas used is argon. In the electrosurgical cutting process, the argon gas simply functions as a protective gas. In the electrosurgical coagulation process, however, the argon gas enables better surface coagulation in comparison with conventional spray coagulation. To ensure safe operation, the following safety instructions must be strictly observed.

### 4.2 Electrosurgery

As the MB 181 is exclusively used in combination with an HF surgical unit, all safety instructions relating to the HF unit (see corresponding Operating Instructions) also apply, without any exception, when using the HF unit in conjunction with the MB 181. Particular heed should be given to the following:

- Instructions for proper patient positioning (see Operating Instructions for the HF surgical unit).
- Instructions concerning correct attachment of the neutral electrode to the patient (see Operating Instructions for the HF unit).

- Special instructions regarding patients with active or passive implants, particularly cardiac pacemakers (see Operating Instructions for the HF unit).
- **Never place the MABS handle on the patient! As the argon plasma beam is capable of building an electric bridge across an open-space distance of several centimeters, this would greatly increase the burn risk for the patient if the system is accidentally activated (the burn hazard being greater even than in the case of conventional HF surgery)!**
- The argon plasma beam can ignite flammable gas mixtures including anesthetics, oxygen, solvent vapors and endogenous gases.
- Activation of the HF current may cause interference with other electrical equipment, particularly patient-monitoring systems.

### 4.3 Pressure Vessels

The gas cylinders in which argon gas is usually delivered represent a source of danger due to their high internal pressure and their weight. Should these cylinders topple over or fall down from a certain height, they could cause severe accidents, especially when the (angle-type) non-return valve is knocked off in the process, with the consequence of uncontrolled pressure release. Therefore, all safety and operating guidelines relating to the transportation, storage and set-up of such pressurized vessels (regardless of the type of gas they may contain) must be duly observed. The following safety guidelines are particularly important:

- **Never transport gas cylinders with the protective cap removed!** Make sure to store the protective cap in a suitable place next to the cylinder after taking it off. When installing the cylinder on a trolley, the cap can be stored on one of the shelves.
- **Standing cylinders must be suitably protected against toppling over!** When installing the cylinders on a MABS trolley, safety belts are provided which keep the cylinder(s) securely in place.
- **Never open the non-return valve when no pressure reducer is connected!**
- **Only use argon as a working gas!** Basically, the MABS pressure reducer can also be connected to other pressure vessels (containing e.g. so-called "special gases" such as carbon dioxide)! Make sure that the high-pressure cylinder to which the MABS pressure reducer is to be connected actually contains argon gas. (The cylinder must read "ARGON"!)
- Note that inert-gas coagulation systems are available on the market which use helium as their working gas. However, this gas cannot be used with the MB 181, as the gas flow controller has been calibrated for argon! Connecting a helium gas cylinder – while technically possible – would mean that the actual gas flow rate is several times higher than indicated!
- **Only use a MABS pressure reducer!** Proper operation and safety are ensured only on use of a genuine MABS pressure reducer!

### 4.4 Embolisms and Emphysemas

When gas is blown into an operating field, it is always possible for the gas to enter into dissected (open) blood vessels. Hence the danger of causing a gas embolism. While it is true that

– unlike air or oxygen – argon gas does not cause blood coagulation (clotting), there is nonetheless the risk that argon gas bubbles may enter the arterial system, obstructing the blood flow in the increasingly thin branches of those vessels (arterioles) to the point of causing a breakdown of the blood flow in the immediate surroundings. Applying the gas outlet at the tip of the applicator directly to the tissue also poses a hazard. In this case, argon gas may be injected into the tissue underneath, thereby causing an emphysema. Where a closed tissue layer is covered by a conjunctiva or the tissue structure involves several skin layers, it is possible for argon gas to be blown between these layers, unwittingly tearing them apart and creating hollow spaces in which relatively large amounts of argon gas can get encapsulated.

To avoid these dangers, observe the following:

- **Never apply the gas outlet nozzle of the applicator directly to the tissue!** If the emitted gas jet (beam) does not ignite easily, either the HF output power must be increased on the HF unit or the tip of the applicator should be replaced (ignition tip of electrode burnt away).
- **Never use the MB 181 for staunching the blood flow from major vessels that have been dissected!** Such bleeding cannot be stopped reliably with the MB 181 (which has a purely superficial effect). Instead, conventional monopolar contact coagulation should be used in these cases, possibly in combination with an arterial clamp.
- Whenever possible, the applicator should not be employed in vertical position relative to the tissue. Instead, hold it at an angle of 30° to 60°.

## 4.5 Additional Insufflation with Endogenous Applications

Using the MB 181 means that argon gas is blown into the operating field. If this site is located in a body cavity, the internal pressure may increase excessively if the gas cannot escape. Laparoscopic operations, in particular, involve the risk of a collapse of the vena cava (and a consequential breakdown of the circulatory system) if the insufflation pressure exceeds the diastolic pressure of this blood vessel. To prevent such a life-threatening situation, observe the following:

- **Use a low gas flow rate!** We recommend using applicators working with low gas flow rates (3 l/min at a maximum).
- Use only insufflators equipped with a pressure monitoring facility which alerts the user as soon as the permissible limit value is exceeded. In this way, the user can take pressure-reducing measures.
- When no insufflator is used, measures should be taken to ensure that the accumulating argon gas is discharged if there is a danger of pressure increase.

## 4.6 Contamination of the Operating Site

The argon gas cylinders, the fittings connected to them and the valve block of the MB 181 (including the gas inlet and applicator connectors) contain no components that can serve as a medium for germs. However, these components are nonetheless unsterile and cannot be sterilized. If this is critical for an application, a disposable sterile filter with a pore size of 0.2 µm

can be inserted between the system's gas outlet and a sterilizable applicator. KLS Martin offers such filters as optional accessories (see section 6). They reliably filter out any germs larger than viruses.

## 5 Safety Checks

At least every 24 months, the following checks and tests must be performed on the unit by qualified persons who have the necessary training, knowledge and practical experience to perform these checks and who are fully competent to carry out such work in an independent and responsible manner.

- Visual inspection: check the unit and its accessories for mechanical and functional damage or defects.
- Check that all safety labels are fully readable.
- Check the fuse cartridges for compliance with rated current and prearcing time/current characteristic.
- Check the pressure reducer and its connecting hose for tightness.
- Switch on the unit and monitor the system self-test for alarms and error messages.
- Check for acoustic and visual signals upon activation.
- In the "Time and Date" submenu (see section 3.7), check the indicated date and time for correctness; adjust if required.
- Carry out electrical checks in accordance with the test report sheet for periodic safety checks.

Leakage currents may not exceed 1.5 times the value measured first and at the same time not exceed the limit value either.

The values measured first are available from the test reports attached, which were established when the unit was first installed.

We recommend the user to record all safety checks and related results in an equipment log.

If the unit is not fully reliable and/or safe to operate, it must either be repaired or the user must be informed of the potential hazards involved in operating the system.

**Please note!**

The unit should only be checked either by qualified Gebrüder Martin service personnel or by a specially authorized service center.



## 6 Accessories

The unit may only be used in combination with accessories, parts subject to wear and disposables that have been certified as safe for use by a testing authority. The use of untested accessories from other manufacturers may pose a hazard. In cases of doubt, please contact the manufacturer.

For accessories specially certified for use with KLS Martin electrosurgical units, please refer to the KLS Martin Accessories Catalog, which is available from Gebrüder Martin or can be directly downloaded via [www.klsmartin.com](http://www.klsmartin.com).

The following MB 181 accessories are available:

MABS handle, 2 switches	80-181-02-04
MABS beam electrode, 25 mm long	80-181-10-04
MABS beam electrode, 100 mm long	80-181-11-04
MABS beam electrode, 320 mm long	80-181-12-04
MABS lancet electrode, 40 mm long	80-181-13-04
MABS lancet electrode, 115 mm long	80-181-14-04
MABS needle electrode, 40 mm long	80-181-15-04
MABS needle electrode, 115 mm long	80-181-16-04
MABS interface cable, 0.95 m	80-181-50-04
MABS foot switch signal cable, 1.2 m	80-181-51-04
MABS pressure reducer DIN 477 No. 6	80-181-52-04 (country-specific version 1: standard)
MABS pressure reducer DIN 477 No. 10	80-181-53-04 (country version 2)
MABS pressure reducer UNI 4412	80-181-54-04 (country version 3)
MABS pressure reducer BS 341 No. 3	80-181-55-04 (country version 4)
MABS pressure reducer CGA No. 580	80-181-56-04 (country version 5)
MABS trolley	80-080-00-04
Sterile filters for insertion into the argon gas supply line of the applicator	80-181-90-04



**Do not connect any other pressure reducer to the MB 181 than one of those provided by Gebrüder Martin as standard accessory!**

## 7 Servicing the Unit

### 7.1 Cleaning and Disinfecting

Always disconnect the unit from the mains before cleaning and disinfecting it. When using cleaning agents and disinfectants, no liquid must be allowed to enter the unit, particularly when using sprays.

Do not clean the unit with scouring agents, disinfectants or solvents that may scratch the surface or damage the unit.

For cleaning and disinfection of the surface, the procedure suggested by the hospital or any other procedure with national recognition and approval shall be applied.

No liquids shall be allowed to ingress into the housing. The unit shall not be sterilized.

Be sure to remove any disinfectant residues before using the unit again.

#### Important note

- Accessories must always be kept in perfect working order. Malfunctioning, damaged or defective accessories can pose a danger to patient and operator alike and may impair the proper functioning of the unit. Accessories unfit for use must be discarded.

### 7.2 Sterilization of Accessories

The following sterilization temperatures are permitted:

	Gas sterilization	Steam sterilization	
	up to 58 °C	at 120 °C	at 134 °C
Electrode handles	yes	yes	yes
Applicator tips	yes	yes	yes

#### Note

- Parts marked as disposable accessories must not be sterilized and reused!
- Hot-air sterilization may not be used for electrodes, cables and other accessories. The high temperatures associated with this type of sterilization could damage insulation, soldered connections, etc.

### 7.3 Non-Sterilizable Accessories

Non-sterilizable accessories like the foot switch should also be regularly wiped clean with a disinfectant. See section 7.1.

## 8 Technical Description

### 8.1 General Information

The KLS **Martin Argon Beamer System MB 181** is an accessory unit for use in electrosurgery. It generates a defined gas flow in the range of 0 l/min to 12 l/min. The gas flow is activated simultaneously with the high-frequency current, whereby two different flow rates can be set, one for cutting and one for coagulating. The gas and the HF current are brought together in the patient-side part of the applicator. To scavenge the applicator with argon gas and make it completely air-free when connected to the gas supply, a special button is provided on the unit allowing the activation of the gas flow but not of the HF current (purge function).

The coagulation process takes advantage of the fact that argon, as an inert gas, is easily ionizable. The HF coagulation current is transported to the tissue surface in a directed, ionized gas flow (argon beam). Thus, the tissue surface can be coagulated in a much more targeted and uniform manner than would be possible with conventional spray coagulation. When used for cutting, the argon gas works as a protective gas flowing around the cutting electrode. It thus minimizes the generation of combustion products but does not play a role in transporting the current or in the cutting process as such. In both operating modes, however, the gas jet helps clearing the operating site by blowing aside any liquids present in the wound.

Argon gas is usually supplied in high-pressure cylinders with a filling pressure of 20 MPa (200 bar). This high pressure must therefore be reduced to between 250 kPa and 450 kPa (2.5 bar – 4.5 bar) directly on the cylinder by using a pressure reducer. At this reduced pressure, the gas is then supplied to the MB 181. **Only one of the MABS pressure reducers listed in item 6 is allowed to be connected to the MB 181.** Alternatively, the MB 181 can be connected to a central argon gas supply if this option is available and guarantees an operating pressure in the range indicated. For this, however, a special adapter hose is required which is available as a special accessory.



**Any central argon gas supply has to be equipped with additional protection means against unpermissible high pressure. It has to be guaranteed that the input pressure at the gas inlet of the MB 181 will not exceed a value of 600 kPa (6 bar).**

Thanks to its regulator, the MB 181 controls the gas flow in such a way that the exact preset gas flow rate is obtained at the patient end of the applicator. The different flow resistances of different applicators are automatically taken into account and therefore have no bearing on the gas flow rate. This makes the MB 181 suitable for endosurgical applications as well, where applicators often incorporate very thin flexible tubes.

The gas flow is always activated at the same time as the HF generator. Apart from a special control element, this requires that both systems, the MB 181 and the HF generator, be connected to each other by a control cable. There are two ways to do this:

- Connect using the serial interface cable. This allows transmission of control signals between the two units in both directions, which means that only one of the two systems needs to be activated directly, the other being activated automatically. Both systems recognize their interconnection automatically. This presupposes, however, that the HF surgical unit also incorporates a serial connector. Only in this operating mode it is possible to use the MABS handle finger switches for argon gas flow activation.
- Connect via the foot switch signal cable. In this setup, the activation signals sent to the MB 181 by a foot switch connected to it are passed on to the foot switch socket of the connected HF surgical unit via a control cable (master-slave operation). This means that the MB 181 can only be activated with the foot switch; the applicator finger switches only activate the HF unit, but not the MB 181.

The MB 181 can be set/configured by means of four buttons arranged next to the LCD screen. All information shown on this screen is displayed by means of a more or less self-explanatory menu.

## **8.2 Argon**

The chemical element argon (atomic number 18) is an inert, atmospheric gas present in the air in a concentration of 0.93%. It can be extracted by air liquefaction. Due to its properties as a noble gas, argon is chemically inert and inactive, which means that it is non-flammable, non-aggressive, non-toxic and odorless. Furthermore, the argon beam plasma is totally free from argon decomposition products. Moreover, its release into the atmosphere (from which it has been extracted) will never cause environmental problems.

While, in principle, any inert gas can be used for operating a beamer, the MB 181 has been specifically designed for use with argon gas. The reason is that argon is by far the cheapest and most easily available of all inert gases. Gebrüder Martin recommends using "quality 4.8" argon with a purity exceeding 99.998%. While the MABS process itself does not require such a high degree of purity, only such high-purity gases – which are primarily used for chemical analysis – are delivered in cylinders not used for industrial purposes (cylinders used in the craft and manufacturing sectors can be very contaminated!). Nonetheless, there are no application advantages in using an argon gas quality higher than 4.8.

Thanks to its inertness, argon has an advantage over carbon dioxide (also used in the medical field) in that it never interferes with the gas exchange processes taking place in the lung. High concentrations of argon can, however, displace the air needed for breathing. In a normally ventilated room, however, no such dangerous and suffocating concentrations can occur as long as the MB 181 is used as intended. There may be some hazards, though, when argon is allowed to flow into non- or poorly ventilated spaces or cavities. Being heavier than air, argon can then accumulate near the ground or floor.

### 8.3 Specifications

Voltage supply: 100 V - 240 V; 50 Hz / 60 Hz

Line fuses: 2 X T 0.8 A (slow-blowing)

Power input: max. 70 VA

Class of protection: I

Classification as per MDD II b  
(Medical Devices Act):

Argon gas flow for CUT: 0.1 l/min to 12 l/min  $\pm$  20%, switch-off by setting to 0.0 l/min

Argon gas flow for COAG: 0.1 l/min to 12 l/min  $\pm$  20%, switch-off by setting to 0.0 l/min

LF leakage currents: as per IEC 601, Part 1

Type of equipment: CF; defibrillator-proof

Mode of operation: continuous duty

Weight: 6.9 kg

Interference suppression: Limit values as per EN 55011 and IEC 601-1-2

Immunity to interference in acc. with IEC 801

Dimensions:	Width	405 mm
	Depth	135 mm
	Height	380 mm

Transportation and storage conditions:	Ambient temperature	-40 °C to +70 °C
	Relative humidity	10% – 100%
	Atmospheric pressure	500 hPa – 1060 hPa



Marked in accordance with the EC Directive 93/42/EEC

## 9 Error Messages and Troubleshooting

The MABS system performs a series of checks and tests both upon switching on the unit and during operation. If a fault is found, an error message is displayed at the bottom of the screen. The following table lists possible error messages and provides instructions as to how the fault or malfunction can be cleared.

Error message	Description	Potential causes/remedies
E01: Underdosage	The flow controller is unable to maintain the set gas flow rate due to gas flow obstruction.	The applicator's gas tube may have a knot or kink in it. In the case of endoscopic applications, a gas flow rate too high for the applicator may have been selected.
E02: Input pressure too low	The input pressure measured at the gas connector is too low.	No argon gas cylinder connected or non-return valve still closed. Cylinder completely empty.
E03: Obstruction	The gas flow to the applicator is partly or totally interrupted/blocked.	Applicator gas tube may have a knot or kink in it. Nozzle (applicator tip) clogged.
E04: Cylinder empty	The filling pressure of the gas cylinder has dropped below 30 bar.	Replace cylinder. If this message appears repeatedly and sporadically despite the fact that the cylinder contains sufficient gas, the pressure reducer may be defective.
E05: Argon low	Indication that the gas cylinder will soon need to be replaced.	If this message appears repeatedly and sporadically despite the fact that the cylinder contains sufficient gas, the pressure reducer may be defective.
E32: Input pressure too high	The argon gas pressure measured at the gas connector socket located on the rear panel of the unit is too high.	This message can sporadically appear if the cylinder's non-return valve has been opened too fast. If, however, this fault occurs regularly when switching on the unit, the pressure reducer is probably defective. If the message disappears after disconnecting and reconnecting the gas hose and switching the unit off and on again, but reappears after extended working pauses or when the unit is switched on later, then the pressure reducer's valve seat is probably defective or clogged by foreign particles.

Error message	Description	Potential causes/remedies
E48: CUT switch activated E49: COAG switch activated	During the initial self-test, the system found that one of the two operating modes (CUT or COAG) had been activated.	Switch the unit off and then on again. If the message pops up again with no function activated, check the connected foot switch for proper functioning. If the message reappears after the foot switch has been disconnected, the unit is probably defective.
E51: SELECT key operated E52: UP key operated E53: DOWN key operated E54: ENTER key operated E55: PURGE key operated	During the initial self-test, the system found that one of the buttons on the front panel had been operated.	Switch the unit off and then on again. If the message reappears although none of the buttons has been operated, the unit is probably defective.
E11: Memory fault COAG E12: Memory fault CUT E13: Memory fault parameters	The safety monitoring system found non-compliance between value pairs.	Switch the unit off and then on again. If the message reappears, the unit is probably defective.
E20-22: Pneumatic system fault	The safety monitoring system detected a malfunction in the gas flow controller.	Switch the unit off and then on again. If the message reappears, the unit is probably defective.
E23, 24: Flow control fault E30: Overdosage E31, 33-36: Sensor fault	The safety monitoring system detected a malfunction in the gas flow controller.	Switch the unit off and then on again. If the message reappears, the unit is probably defective.
E37, 38: Memory check error E58: RAM error E59: ROM error	The safety monitoring system detected an error when checking the internal data memories.	Switch the unit off and then on again. If the message reappears, the unit is probably defective.
E39: IIC bus fault E41, 42: IIC bus blocked	An internal communication problem was detected.	Switch the unit off and then on again. If the message reappears, the unit is probably defective.
E56: Time base error E57: Watchdog reset	There has been a problem in the execution of the internal operating program.	Switch the unit off and then on again. If the message reappears, the unit is probably defective.

To run the internal self-test completely and successfully, the MB 181 must have been connected to the argon gas supply. If this is not the case, the E02 error message ("Input pressure too low") will be displayed and the self-test will be aborted. Upon connecting the argon gas cylinder, the self-testing routine will be automatically carried out once again.

## **10 Warranty**

Our General Conditions of Sales effective at the time shall apply.

Within this period of guarantee all defects proven to be manufacturing or material defects are repaired free of charge by our appointed service agent or directly in our factory.

Please keep the guarantee card and note its wording.

### **Important Note**

Any repairs to be performed on the unit may be carried out only by the manufacturer's own personnel or by a qualified person or firm that has been expressly authorized by us to perform such work.

If repair work has been carried out by an authorized person or company, the serviceman is required to issue to the user/owner a certificate detailing about the nature and scope of the maintenance or repair work done. Such certificate must show the date when the work has been carried out and must be signed, giving full particulars as to the person/company performing the work. If repair work has been carried out by a party other than the manufacturer, the equipment or parts repaired must be labeled, in addition, with the repairer's identification mark.

## **11 Ecological Information**

### **11.1 Packing**

At the customer's request, Gebrüder Martin is willing to take back the complete packing in which the MB 181 has been delivered. All parts of the packing are recycled if possible.

Alternatively, the packaging material may be disposed of through the normal paper/household garbage collection.

### **11.2 Ecological Aspects of Operation**

When using the MB 181 on the tissue, any type of HF surgery is associated with the development of smoke gases. Be sure not to inhale these unavoidable vapors in a concentrated manner over an extended period of time. Apart from them, however, no other noxious substances are emitted during the normal use of the unit.

If the treatment is interrupted and the unit is not being used for an extended period, we recommend you to switch it off for safety as well as economic reasons.




If disposable accessories are used in an operation, please note that these articles may not be disposed of with normal household waste or high-risk waste unless they have been carefully cleaned, disinfected and sterilized (if necessary). Infected sharp parts of disposable instruments must be treated like other "sharps" (cannulas, needles and scalpels), which means disposal by using bacteria- and stitch-proof containers.

### 11.3 Disposal of the Unit

In designing the unit, we tried to avoid using compound materials wherever possible. This allows a high degree of recycling after the lifetime of the unit. We therefore offer to take the unit back for proper disposal and recycling.

Please note that existing regulations concerning the disposal of electronic waste have to be respected when disposing of the unit.

	<p><b>Marking of electric and electronic equipment in accordance with Directive 2002/96/EC (WEEE Directive) and the German Electrical and Electronic Equipment Act (ElektroG)</b></p> <p>This symbol on the product or its packaging indicates that the product may not be disposed of as normal household garbage.</p>
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