

**STATIC FREQUENCY CONVERTER**

**SFU 0101 + 0201**

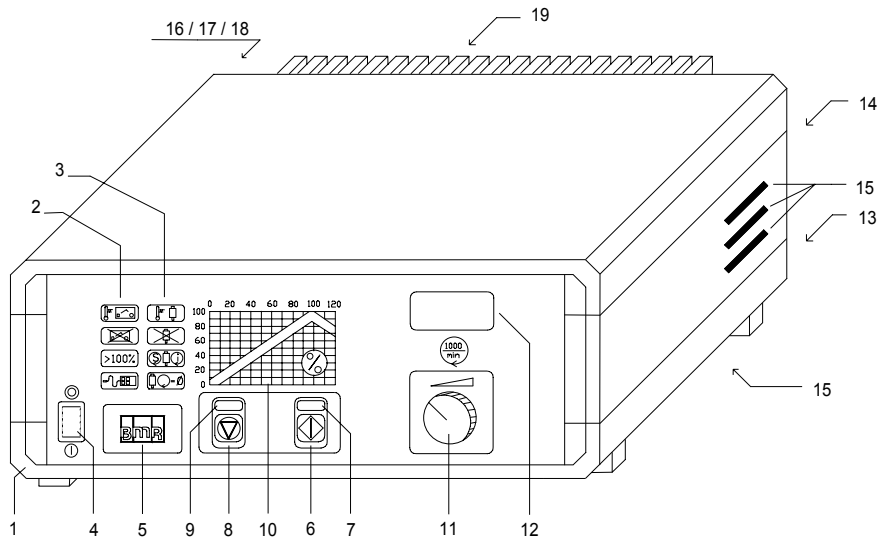


**GB**

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## Elements for operation and connection SFU 0101 - 0201



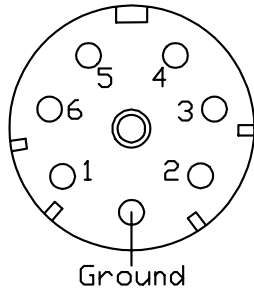
1. housing
2. display for changer
3. display for spindle
4. power switch
5. manufacturers emblem
6. press button spindle "ON"
7. display spindle "ON"
8. press button spindle "OFF"
9. display spindle "OFF"
10. load display (load of spindle as %)
11. adjustment of rotational speed
12. digital display of rotational speed
13. control connector 15 poles (back)
14. spindle connector (back)
15. vent
16. power supply (back)
17. safeguard (back)
18. IAS-connector - 25 poles (back) *only by configuration IAS*
19. heat sink
20. ----

### Technical Data

- ◆ microcontroller: supervision, controlling and closed-loopcontrol
- ◆ mains voltage: 230 V AC 50 / 60 Hz
- ◆ protection: 2,5 A / 250 V
- ◆ output power: 250 W (400 W)
- ◆ power input: 300 W (650 W)(a short time)
- ◆ output voltage: 3 x 0 ... 36 V (0...60 V)
- ◆ maximum output current: I max. 8 A
- ◆ frequency range: 83 ... 1.000 Hz  $\hat{=}$  5.000...60.000 rpm (max.1333 Hz  $\hat{=}$  80.000 rpm) other frequencies are programmable by software
- ◆ the 3 phases are short-circuit proofed by an electronic current limitation
- ◆ weight: 5,5 kg
- ◆ measurements (w\*h\*d): 290 \* 107 \* 295 mm
- ◆ The housing consists of an impact-strong ABS plastic, colour similar RAL 7035(Other housings, for example 19"- Rack, are also deliverable as option)

## CONNECTION SFU 0101 - 0201

### Control Connector (14) 7 poles for spindle



front view

Pin 1 = rotational speed knowing

Pin 2 = R

Pin 3 = S 3 Phases for spindle

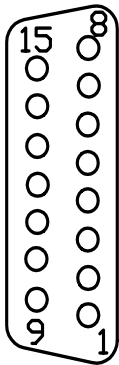
Pin 4 = T

Pin 5 = + PTC

Pin 6 = + field panel

Pin 7 = Ground

### Control Connector (13) 15 poles SUB-D-JACK



pin 1 = common connection for relay

pin 2 = make contact by reaching rotational speed (desired value / active value)

pin 3 = break contact by superheat (converter or spindle)

pin 9 = make contact by standstill (desired value / active value)

pin 10 = break contact by load >100%

pin 6 = make contact by „converter ready“

pin 4 = dependent on configuration of the converter:  
DC Out-active value spindle 1V / 10000 U<sub>pm</sub>  
DC Out-active power 0...10V  $\triangleq$  0...100%

pin 11 = DC sheduled - In (1V / 10000 rpm)

pin 12 = DC sheduled - Out

pin 8 = ( $\perp$ ) ground

pin 7 = impulse magnetoresistor

pin 5 = +5V 40 mA (for example fiberotic)

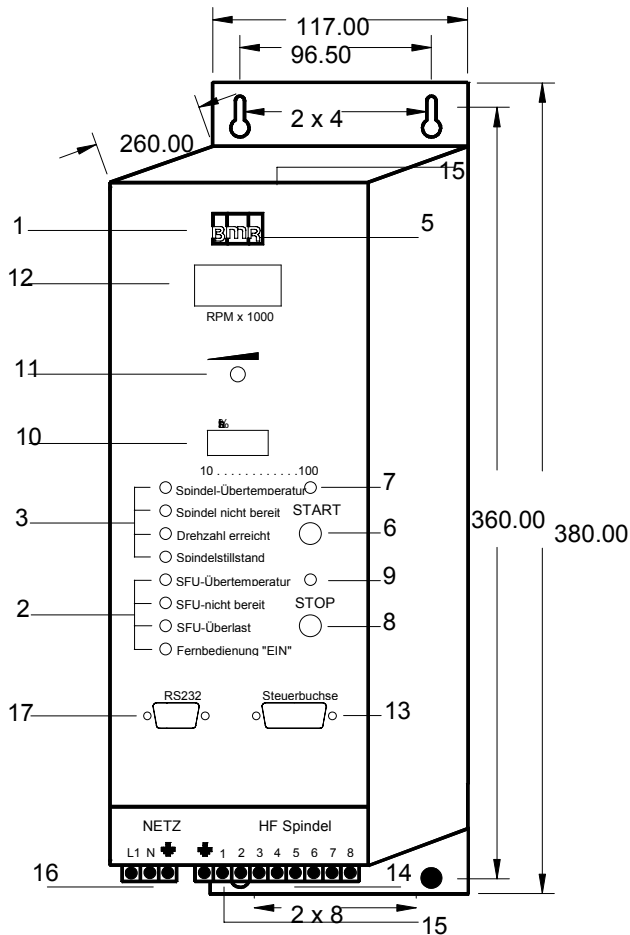
[optional reversing direction of rotation (+12V...24V)]

pin 13 = RxD (RS 232)

pin 14 = TxD (RS 232)

pin 15 = emergency shutdown interlock

## Elements for operation and connection SFU 0101 - 0201 SSE



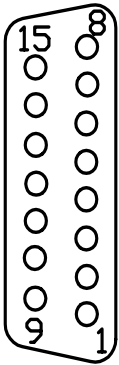
1. housing
2. display for changer
3. display for spindle
4. ----
5. manufacturers emblem
6. press button spindle "ON"
7. display spindle "ON"
8. press button spindle "OFF"
9. display spindle "OFF"
10. load display (load of spindle as %)
11. adjustment of rotational speed
12. digital display of rotational speed
13. control connector - 15 poles (back)
14. spindle connector - 7 poles (back)
15. vent
16. power supply (back)
17. RS 232
18. ----
19. ----
20. ----

### Technical Data

- ◆ microcontroller: supervision, controlling and closed-loopcontrol
- ◆ mains voltage: 230 V AC 50 / 60 Hz
- ◆ protection: 2,5 A / 250 V
- ◆ output power: 250 W ( 400 W)
- ◆ power input: 300 W (650 W)(a short time)
- ◆ output voltage: 3 x 0 ... 36 V (0..60 V)
- ◆ maximum output current: I max. 8 A
- ◆ frequency range: 83 ... 1.000 Hz  $\hat{=}$   
5.000...60.000 rpm  
(max.1333 Hz  $\hat{=}$  80.000 rpm)  
other frequencies are programmable by software
- ◆ the 3 phases are short-circuit proofed by an electronic current limitation
- ◆ weight: 6,5 kg
- ◆ measurements (w\*h\*d): 117 \* 380 \* 270 mm

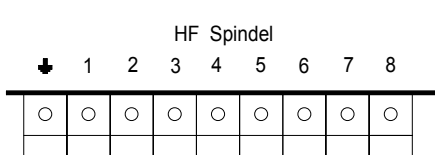
# CONNECTION SFU 0101 - 0201 SSE

## Control Connector (13) 15 poles SUB-D-JACK



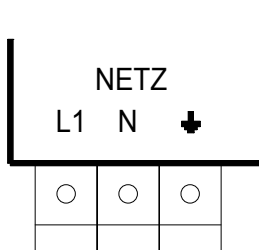
- pin 1 = common connection for relay
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- pin 3 = break contact by superheat (converter or spindle)
- pin 9 = make contact by standstill ( desired value / active value)
- pin 10 = break contact by load >100%
- pin 6 = make contact by „converter ready“
- pin 4 = dependent on configuration of the converter:  
DC Out-active value spindle 1V / 10000 Upm  
DC Out-active power 0...10V  $\triangleq$  0...100%
- pin 11 = DC sheduled - In (1V / 10000 rpm)
- pin 12 = DC sheduled - Out
- pin 8 = ( $\perp$ ) ground
- pin 7 = impulse magnetoresistor
- pin 5 = +5 V 40mA (for example fiberotic)  
[optional reversing direction of rotation (+12 V ... 24V)]
- pin 13 = RxD (RS 232)
- pin 14 = TxD (RS 232)
- pin 15 = emergency shutdown interlock

## pressure clamp (14) 7-poles for spindle connection



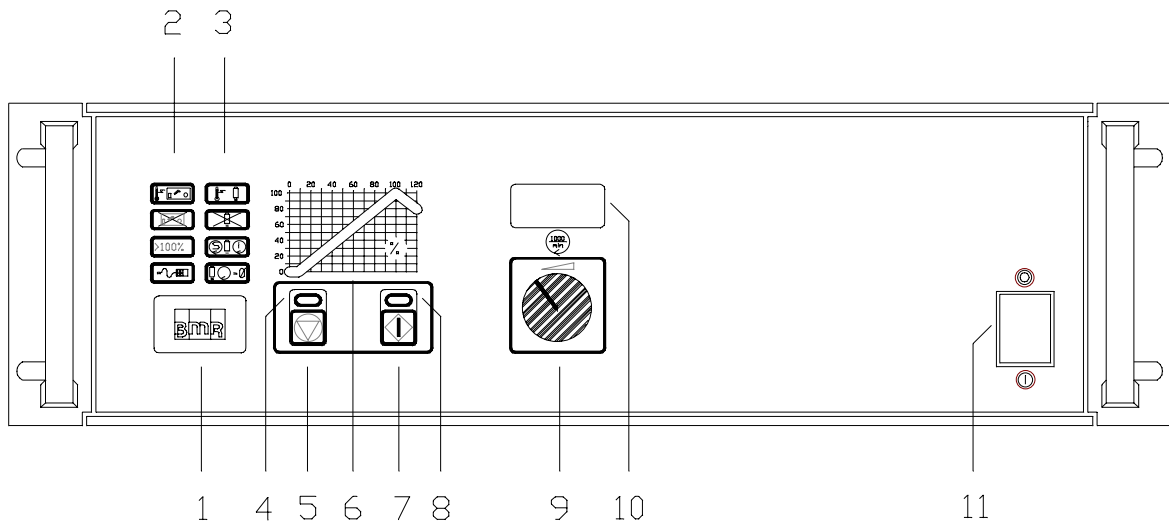
- KL = chassis ground
- KL 1 = R
- KL 2 = S 3 phases for spindle
- KL 3 = T
- KL 4 = + PTC
- KL 5 = + magnetoresistor
- KL 6 = ( $\perp$ ) Ground for magnetoresistor and PTC
- KL 7 = Anschnitterkennung (optional)
- KL 8 = Anschnitterkennung (optional)

## pressure clamp (16) 3-poles for mains-connection



- KL L1
  - KL N
  - KL chassis ground
- } mains-connection

## Elements for operation and connection SFU 1901 - 1902 19''-Rack



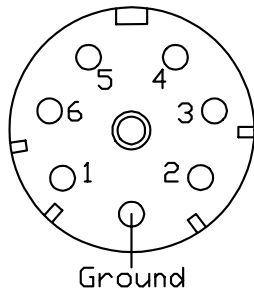
1. housing
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6. press button spindle "ON"
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10. load display (load of spindle as %)
11. adjustment of rotational speed
12. digital display of rotational speed
13. control connector - 15 poles (back)
14. spindle connector - 7 poles (back)
15. vent
16. power supply (back)
17. safeguard (back)
18. ----
19. ----
20. ----

### Technical Data

- ◆ microcontroller: supervision, controlling and closed-loopcontrol
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- ◆ output voltage: 3 x 0 ... 36 V (0..60 V)
- ◆ maximum output current: I max. 8 A
- ◆ frequency range: 83 ... 1.000 Hz  $\triangle$   
5.000...60.000 rpm  
(max.1333 Hz  $\triangle$  80.000 rpm)  
other frequencies are programmable by software
- ◆ the 3 phases are short-circuit proofed by an electronic current limitation
- ◆ weight: 8 kg
- ◆ measurements (w\*h\*d) 480 \* 135 \* 280 mm
- ◆ The housing is a 19''-Rack, 3 HE / 84 TE

## CONNECTION SFU 1901 - 1902 19''-Rack

### Control Connector (14) 7 poles for spindle



front view

Pin 1 = rotational speed knowing

Pin 2 = R

Pin 3 = S 3 Phases for spindle

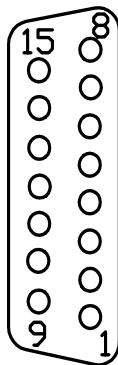
Pin 4 = T

Pin 5 = + PTC

Pin 6 = + field panel

Pin 7 = Ground

### Control Connector (13) 15 poles SUB-D-JACK



pin 1 = common connection for relay

pin 2 = make contact by reaching rotational speed (desired value / active value)

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pin 9 = make contact by standstill ( desired value / active value)

pin 10 = break contact by load >100%

pin 6 = make contact by „converter ready“

pin 4 = dependent on configuration of the converter:  
DC Out-active value spindle 1V / 10000 Upm  
DC Out-active power 0...10V  $\pm$  0...100%

pin 11 = DC sheduled - In (1V / 10000 rpm)

pin 12 = DC sheduled - Out

pin 8 = ( $\perp$ ) ground

pin 7 = impulse magnetoresistor

pin 5 = +5V 40 mA (for example fiberotic)

[optional reversing direction of rotation (+12V...24V)]

pin 13 = RxD (RS 232)

pin 14 = TxD (RS 232)

pin 15 = emergency shutdown interlock



## General Comments

**Our high frequency converters are high quality precision devices. Be sure to handle them with the required care so as to ensure that their high degree of accuracy, excellent performance and long life expectancy are retained.**

The converters do not leave our works until after having been subjected to an extensive „load test“. Before installing the equipment, carefully read the instructions supplied with it. Additionally, the following rules should be observed:

- Before commissioning, see that the equipment is in perfect condition. If the converter has been damaged in transit, it should on no account be connected.
- When installing the equipment it is essential that the current health and safety regulations are strictly observed.
- Before starting the converter in the vicinity of any heat sources or magnetic components.
- Sufficient air circulation must be ensured around and, particularly, within the converter.
- No liquid must be allowed to penetrate into the housing. If there is any evidence that this might have happened, the equipment must be switched off immediately.
- If the converter is to be connected to a remote control, be sure, when connecting, that the switch on the pool is in the „OFF“ position.
- All jobs performed in connection with one of our converters must be carried out exclusively by personnel specifically trained for this task.
- Any work on the converter and its accessories must be carried out by qualified experts, the power source having been disconnected (with the mains plug removed from its socket). In doing so, national accident prevention regulations as well as general and local installation and safety rules (for instance by the Association of Electrotechnical Engineers of the respective country) must be complied with.

Our **general comments** can only provide a rough survey of existing rules and regulations, as BMR is not in a position to take into account varying local conditions. It is the duty of the manufacturer of the plant or machinery to make sure the value limits imposed by law for electro-magnetic compatibility (EMC) are complied with. By monitoring our products in our own test laboratory, we at BMR guarantee that, properly installed, they will meet the relevant standards.

# Operating Instructions

## GENERAL

This Static Frequency Converter includes a microcontroller, which controls, supervises and regulates all functions, such as analogue and digital interfaces, evaluations, data inputs, respectively effective transmission-parameters; which can also be changed by software.

## POWER SWITCH

After the Power-button is switched "ON"; the Static Frequency Converter starts an automatic check for about 8 seconds. During this time all displays flash a short time one after another. After this automatic check the converter is ready for operation.

In case of defect the corresponding display flashes.

## SPINDLE "START"

After pressing the „START“-button the spindle starts to come up to the rotational speed adjusted by the rotary knob (11).

The coming-up speed is adjusted to 10.000 rps by manufacturer.

On request the coming-up speed can be changed.

## SPINDLE "STOP"

After pressing the "STOP"-button the spindle will be electronically stopped to stand still. The braking time corresponds to the adjusted coming-up speed.


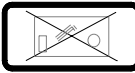


It's only possible to slow down the spindle with the „STOP“-button if the remote control is *not* „ON“.

By pressing power switch „OFF“ there is no electronic slow down, but the spindle runs out by itself.

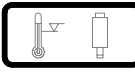
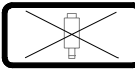

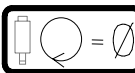
## DIGITAL DISPLAY FOR ROTATIONAL SPEED

The digital display of rotational speed indicates the adjusted rotational speed.

## DISPLAY FOR CONVERTER

Display (2.1)		= converter superheat
Display (2.2)		= converter is not ready for operation
Display (2.3)		= load of converter or load of spindle higher than 100%
Display (2.4)		= remote control „ON“

### **DISPLAY FOR SPINDLE**

Display (3.1)		= spindle superheat
Display (3.2)		= spindle is not ready for operation
Display (3.3)		= rotational speed reaches „desired value“ or „actual value“, respectively
Display (3.4)		= standstill of spindle

### **LOAD DISPLAY**

The load display indicates the present load of spindle in %.

"green area" = within the admissibility  
 "red area" = overload

If the spindle is not loaded and no defect exists, the load-display indicates approx. „0%“.

### **OVERLOAD DISPLAY**

The display (2.3) always flashes, if the spindle was overloaded or the interruption for overload responded.

## **OVERLOAD POWER CUT**

If the spindle is running more than 10 seconds [programmable by software (1 ... 10 sec.)] an interruption for overload will follow.

I.e. after this time the converter automatically disconnects the spindle and the displays (2.2) and (2.3) are flashing.

Another „power-up“ of the spindle can only follow if the display (2.2) disappears.

The display (2.3) disappears if the spindle is „powered-up“ again.

## **EXCESS TEMPERATURE OF CONVERTER**

When the converter reached the excess temperature the display (2.1) flashes.

Delayed with 3 seconds [programmable by software (1...10 sec.)] the converter switches to „STOP“ and the display (2.2) flashes.

The spindle can not be switched „ON“ before the display (2.2) disappeared.

The display (2.1) disappears by another „power-up“.

## **EXCESS TEMPERATURE OF SPINDLE**

If the spindle reached the excess temperature the display (3.1) flashes.

Delayed with 3 seconds [programmable by software (1...10 sec.)] the converter switches to „STOP“ and the display (3.2) flashes.

The spindle can not be switched „ON“ before the display (3.2) disappeared.

The display (3.1) disappears by another „power-up“.

<p><b><u>ATTENTION:</u></b> This evaluation is only possible if the spindle is equipped with a temperature sensor. (Option after arrangements)</p>
--

## REMOTE CONTROL

The remote control of the converter is connected via the 15-poles SUB-D-JACK (13).

The display (2.4) flashes whenever the converter is remote controlled.

### POSSIBILITIES OF REMOTE CONTROLLING:

- a; Via a potentialfree contact to Pin 11 and Pin 12 the spindle can respectively be switched „ON“ or „OFF“

contact open	= spindle „OFF“
contact closed	= spindle „ON“

- b; Installing of a direct voltage (+) on Pin 11 and (⊥) on Pin 8  
I. e. with this possibility the rotational speed can be adjusted.

1 V / 10000 rpm

< 0,5V meets spindle "OFF"  
≥ 0,5V meets spindle „ON“ 5000 rpm.

**ATTENTION:** The direct voltage must not transgress 12V and should be free of interfering voltages.

- c; Via the serial interface (RS 232) Pin 13 RxD, Pin 14 TxD and Pin 8 (⊥)

## ROTATIONAL SPEED REACHED

If the spindle reached the presetted rotational speed, one of the two halves of display (3.3) flashes.

The left half with the symbol „desired value“ flashes if the internal frequency of the converter corresponds to the adjusted frequency.

This evaluation happens whenever the spindle is not equipped with a magnetoresistor.

The right half of the symbol „actual value“ flashes if the spindle axle reached the adjusted rotational-speed in fact (actual evaluation).

**Attention:** This is only possible if the spindle is equipped with a magnetoresistor

## **STANDSTILL OF SPINDLE**

The display (3.4) flashes whenever the spindle axle stands still.

The converter considers two possibilities of the evaluation:

- a; if the spindle is not equipped with a magnetoresistor the symbol flashes when the converter stopped giving more frequency (standstill of converter)
- b; if the spindle is equipped with a magnetoresistor the symbol flashes not before the spindle-axle is standing still.

## **CONFIGURATION 1 ROTATIONAL SPEED OUTPUT**

With the control connector (13) Pin 4 (+) and Pin 8 (⊥) Ground, a direct voltage is given out which corresponds to the rotational speed of the spindle axle.

1V / 10000 rpm

**Attention:** This is only possible if the spindle is equipped with a magnetoresistor

## **CONFIGURATION 2 ACTIVE LOAD OUTPUT**

With the control connector (13) Pin 4 (+) and Pin 8 (⊥) Ground, a direct voltage is given out which corresponds to the load of the spindle.

0...10 V  $\hat{=}$  0...100%

<b><u>INFORMATION:</u></b> Standard for delivery is the configuration „rotational speed output“!
--

## **REVERSING DIRECTION OF ROTATION (optional)**

To arrange the reversing direction of rotation, apply a direct-voltage of +12V...24V on Pin 5 of the Control-Connector (13).  
[Pin 8 (⊥) Ground]

This function is only possible, if the spindle-axle stands still.  
[display (3.4) flashes].

If you arrange or disable the signal during the spindle rotates, the direction or rotation will be changed after the next „standstill of spindle“.

### **EMERGENCY SHUTDOWN INTERLOCK**

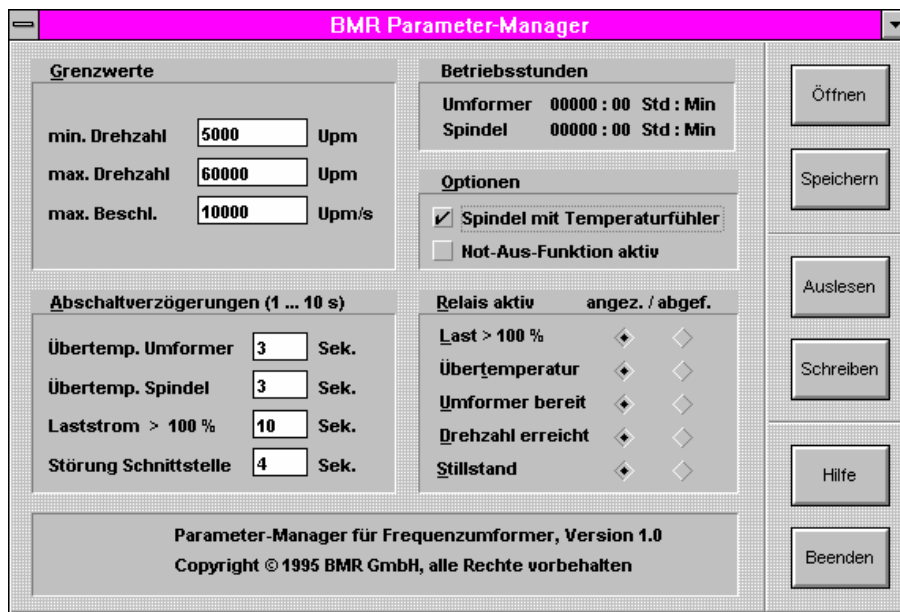
The emergency shutdown interlock can be programmed by software „active“ or „inactive“.  
Programming „inactive“ is insignificant, whereas with a „active“ programming a primary stop-command can be given. This means that the converter cannot be started again neither by the „Start-button“ nor by the remote-control and that the spindle will be controlled slowed down.

To abolish the command „shutdown-interlock“ there must be injected a voltage of 5V...30V on the control connector (13)  
Pin 15 (+) and Pin 8 (⊥).

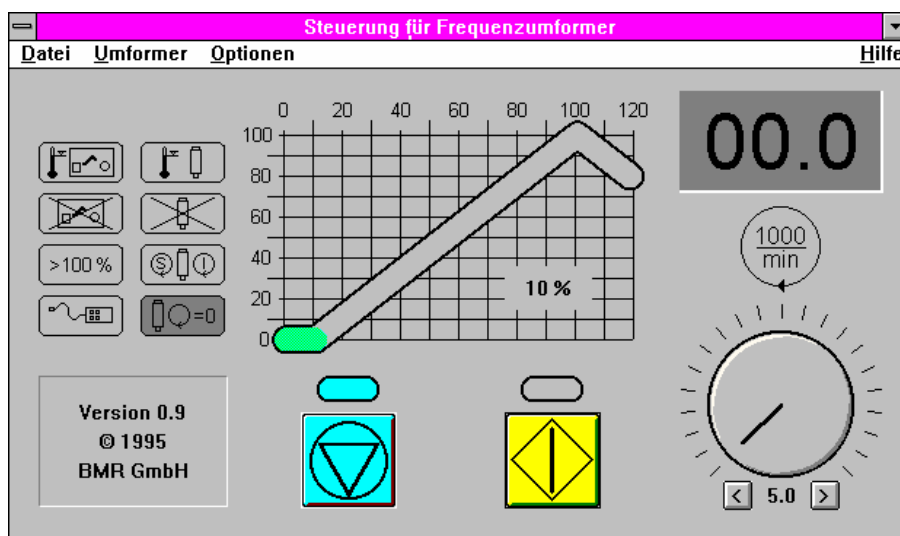
<p><b><u>ATTENTION:</u> The Spindle is not grounded by the Converter, but it <b>must be grounded via the spindle-support</b></b></p>
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## SPECIAL ACCESSORIES (optional)

- a; BMR Parameter-Manager (menu program for MS-Windows®)  
This program can change the differently effective transmission parameters and is also able to read the operating hours.



- b; Controlling for the converter (menu program for MS-Windows®)  
The converter can be controlled and supervised with this program.





## Guarantee

Excluding all further claims, BMR guarantees the converter and its accessories against faulty materials, workmanship and design for a period of up to 12 months from the date of delivery.

Under this guarantee we undertake to repair or exchange, free of charge, any parts which our examination found to be defective. However, our guarantee does not cover defects arising from improper operation.

BMR must be notified in writing, without delay, of any defects that may have appeared, and the equipment found defective must be returned to BMR, carriage paid, within the guarantee period.

Guarantee is void in case of non-observance of the above or if the control unit has been tampered with by a third party.

Our obligation under this guarantee is limited to the repair or replacement of the defective parts. We shall not assume liability or make good for consequential damages directly or indirectly arising from defective products supplied by us.

We reserve the right to amend or modify the design without prior notice and without calling special attention to such modification.

Further, our General Terms and Conditions of Trade apply.

The spindle will be guaranteed by the respective spindle manufacturer.

BMR is a dynamic and flexible company. Customers' individual needs just as well as sophisticated design solutions receive consideration and are integrated under the aspect of quality and functionality, while it is understood that our high standards are being maintained.

Our company works in compliance with the highest economical and ecological criteria, reflected in all areas at BMR. Particularly in the manufacturing section we are striving for continual improvement of our ecological standards. It has been, and continues to be, our permanent endeavour to meet these demands.

Owing to our continuous efforts we achieved DIN ISO 9001 certification in 1998.

Technical changes reserved