

## Frequency Converter SFU 0154-1

**Quality**  
**Made in Germany**

**We thank you for choosing a BMR-Product !  
This product was carefully developed and manufactured in Germany  
at BMR-GmbH**

**⇒ Please read this manual carefully before first operation!**

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## 1. Description and Features

- Operation of **AC spindles**
- The frequency converter **SFU 0154-1** allows **speed frequencies** up to **60,000Upm** with 2-pole spindles.
- The core of SFU-0154-1 is a **digital signal processor** (DSP) which produces all output parameters and collects signals.
- **High-precision sinusoidal** output signals with a low distortion factor and low deformation allow for optimal rotation qualities in AC motors of all operating conditions
- All parameters like power, voltage and frequency are collected in **real time** and are regulated by the implemented vector control depending on the load.
- High **operating safety**: All operating conditions like acceleration, operation with nominal rotation speed, braking are controlled and critical conditions are intercepted.
- **Short circuit protected**
- **Protection against excess temperature.**

## 2. Technical Data

Power Supply	SL4	Logic Supply: 24V/0,25A DC Spindle Supply: 48V/6A DC pluggable screw terminals 4mm <sup>2</sup>	Fuse: FS1:T250mA Fuse: FS2:T6,3A
Power		250VA	
Spindle Connection	SL3	4-pin: U, V, W, PE pluggable screw terminals 4mm <sup>2</sup>	
Output Voltage		depending on the spindle characteristic: max. 3 x 38V	
Output Current		electronically limited and matched to the corresponding spindle	
Output Frequency		AC: 1.000Hz / max 60.000 rpm	
Control Inputs	Header SL2	Pin1 : Start / Stop ( 0 / 24V ) "0": 0..7V, "1": 18..24V Pin3 : Set Value Rotational Speed ( 0..10V )	
Control Outputs	Header SL2	OC1: Pin9 : Converter Ready ( open collector 45V/0,5A ) OC2: Pin7 : Converter Overload ( open collector 45V/0,5A )	
Operating Status Indicators		Converter Ready: LED green Converter Overload: LED red	
Interface	Header SL5	RS232: 115.200Bd, 8Daten 1Stop Bit, No Parity	
Dimensions		Approx..132 x 133 x 55	L x B x H (mm) open frame style
Operating Conditions		10°C bis 40°C / Rel. Humidity max. 80%	



**Attention:**  
Please verify that all power supply voltages are correct in polarity and value

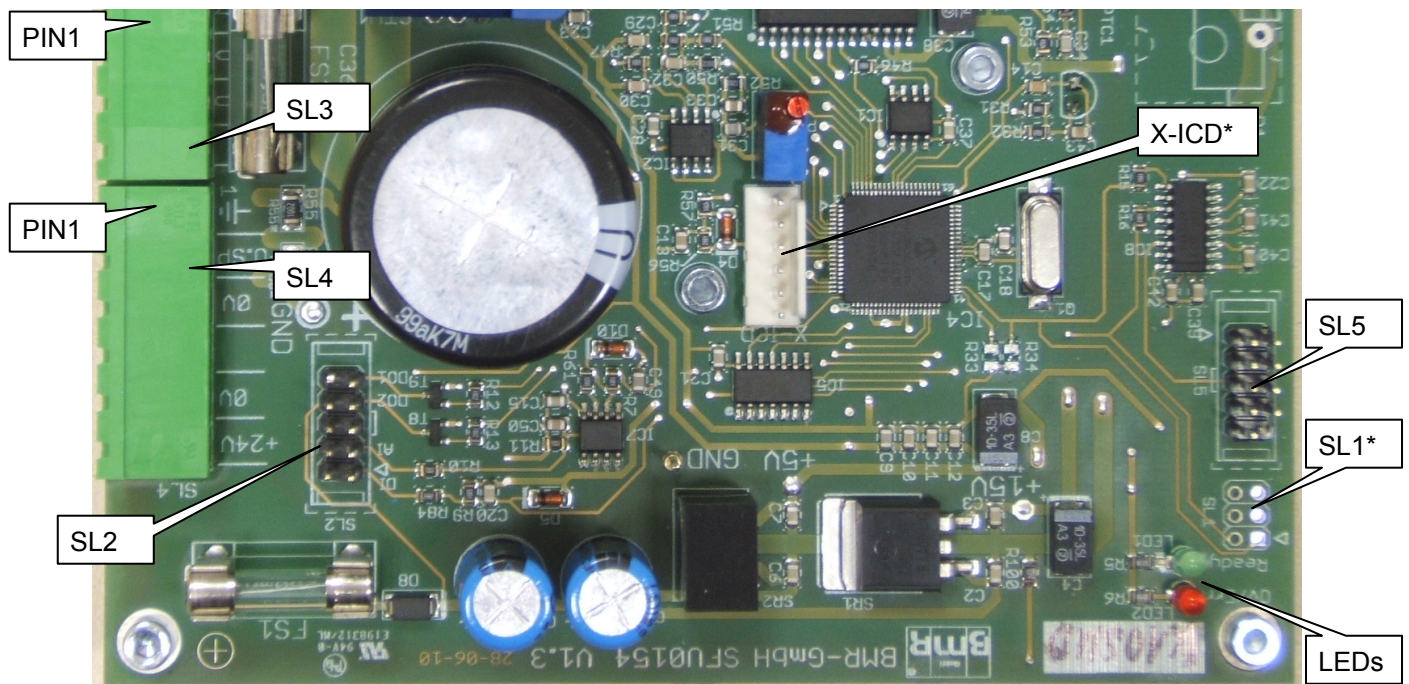


**Attention:**  
Please ensure to have the proper characteristic selected, always!  
The operation of a spindle with a wrong characteristic may harm the spindle severely!

### 3. Safety-Precautions and Warnings

- This device produces dangerous electrical voltages and is used for the operation of fast spinning tools. Because of their high rotational speed, it may be dangerous in case of improper handling. For this reason, only professionally trained and qualified personnel should be allowed to work with and setup this device!
- Any maintenance or repair work to the device must only be carried out after the supply voltage has been disconnected!
- Before the first commissioning can be carried out, it should be established that the motor is installed correctly and securely, to eliminate the possibility of uncontrolled movement of the motor.
- Safety regulations that are valid for the country where the device is used, must be adhered to where any work is carried out on the device.
- Maintaining EMC (electromagnetic compatibility) limits is the responsibility of the manufacturer of the machine or device. The inputs and outputs on this device are fitted with filters, to increase the interference immunity and reduce emitted interference, making it possible to use this device in an industrial environment.
- The EMC of a machine or device is affected by all connected components (motor spindle, length and type of cables, wiring, etc). Under certain conditions the use of additional filters can be necessary to maintain the current laws.
- For the reasons listed above, installation and connection of the device should be carried out by qualified personnel only.

## 4. Connections, Plugs and Pin Assignments



\* SL1 and X-ICD for internal use only

### 4.1 Power Supply Connection SL4 (pluggable screw terminals)

Pin	Function	Description
1	PE	Protective Earth, is internally connected to mounting bracket
2	+48V <sub>DC</sub>	+ Supply Voltage for spindle -> Fuse FS2 6,3AT protected against voltage reversal and back emf voltage from spindle with Diode D7. Voltages measured here are not buffered by a cap
3	0V (48V)	return for spindle supply
4	NC	not connected
5	0V (24V)	return for controller supply (internally connected with 3)
6	+24V	+ Supply voltage for control logic -> Fuse FS1 250mAT protected against voltage reversal with Diode D8

### 4.2 Spindle Connection SL3 (pluggable screw terminals)

Pin	Function	Description
1	W	Spindle Phase W
2	V	Spindle Phase V
3	U	Spindle Phase U
4	PE	Protective Earth of spindle and cable shield

### 4.3 Inputs and Outputs SL2 (2.54mm Header)

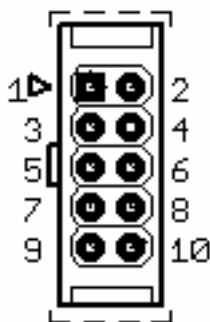
Pin	Function	Description / default function
1	Digital Input1	<b>Start/Stop</b>
3	Analogue Input1	Set value for <b>rotational speed</b>
2,4	Ground	Ground Ref for Pin 1,3,7,9
5	+5Vdig	auxiliary supply <sup>(1)</sup>
7	Open Collector 2	open collector output for indication <b>Converter ready</b>
8	+24V	auxiliary supply <sup>(1)</sup>
9	Open Collector 1	open collector output for indication <b>Converter Overload</b>
6,10	NC	Not Connected

The scaling of the Analogue input can be modified, as well as the function of the open collector outputs can be defined freely. The noted functions are the factory default setup.

<sup>(1)</sup> Attention, in case of using the auxiliary voltage particular care is required and lies under the responsibility of the user! The voltages are not fused and +5Vdig is directly connected with the DSP and all other ICs. Potential errors at the wiring may harm the board.

### 4.4 Serial Interface SL5 (2.54mm Header)

For easy adaption a standard flatwire connector with Dsub9 can be connected here directly, as it is used with PCs



Pin	Function
1	RxD
2	TxD
2,6	NC
4	Ground
5	NC (Pin removed for Coding)

## 5. Functions, Setup, Operation

### 5.1 Start / Stop

There are two possibilities to start the spindle:

**digitally** with a digital control signal at digital input1 **Start/Stop** at SL2.1.  
The switching levels for "OFF=0" are 0...7V and for "ON=1" 18...24V, voltages between 7V and 18V are undefined.

→ As soon as this is initiated, the spindle will be accelerated to the set value of the rotational speed which is pre-selected as voltage at analogue input1 **Set Value of Rotational Speed** at SL2.2.

**analogue** with a voltage at analogue input1

Precondition is a valid "ON" signal at digital input1 **Start/Stop**

→ An input voltage of 0V makes the spindle stop, and a voltage higher than 0,29V starts the spindle up to a rotational speed according to the scaling.

### 5.2 Set Value of Rotational Speed

There are two possibilities for scaling the rotational speed

- **0-10V / Min-Max:** The default scaling for the analogue value is according the Min/Max values of the rotational speed from the spindle characteristic  
e.g.: set values are Min: 5.000rpm, Max: 60.000

This results in a formula for the control voltage u:  $u = \text{set value} * 10V/60.000\text{rpm}$

A voltage of  $u < 0,8V$  realizes standstill, a voltage of 0,8V sets the minimum speed of 5.000rpm and 10V sets the maximum rotational speed of 60.000rpm.

- Another option of the input scaling is **1V/10.000rpm**.

### 5.3 Outputs

As feedback signals to a PLC or another control there are open collector outputs available. They indicate the current operational status of the converter.

The functions can be setup freely, as factory default SL2.7 indicates **Overload** and SL2.9 indicates **Converter Ready**. In this case, the PIN is drawn to ground.

### 5.4 LEDs

Likewise the open collector outputs there are LEDs indicating the current operational status of the converter.

GREEN	RED	Function
Off	Off	Converter Not Ready
On	Off	Converter Ready
On	On	Overload or Error
Off	blinking	internal Error

## 6. Safety Functions

The following safety functions bring about controlled stop of the spindle according predefined deceleration times

- Safety stop because of converter excess temperature after delay-time of 10s is exceeded
- Safety stop by overload and time delay exceeded (default 10sec)
- Safety stop will occur immediately by exceeding the maximum admissible spindle current.

## 7. EMC

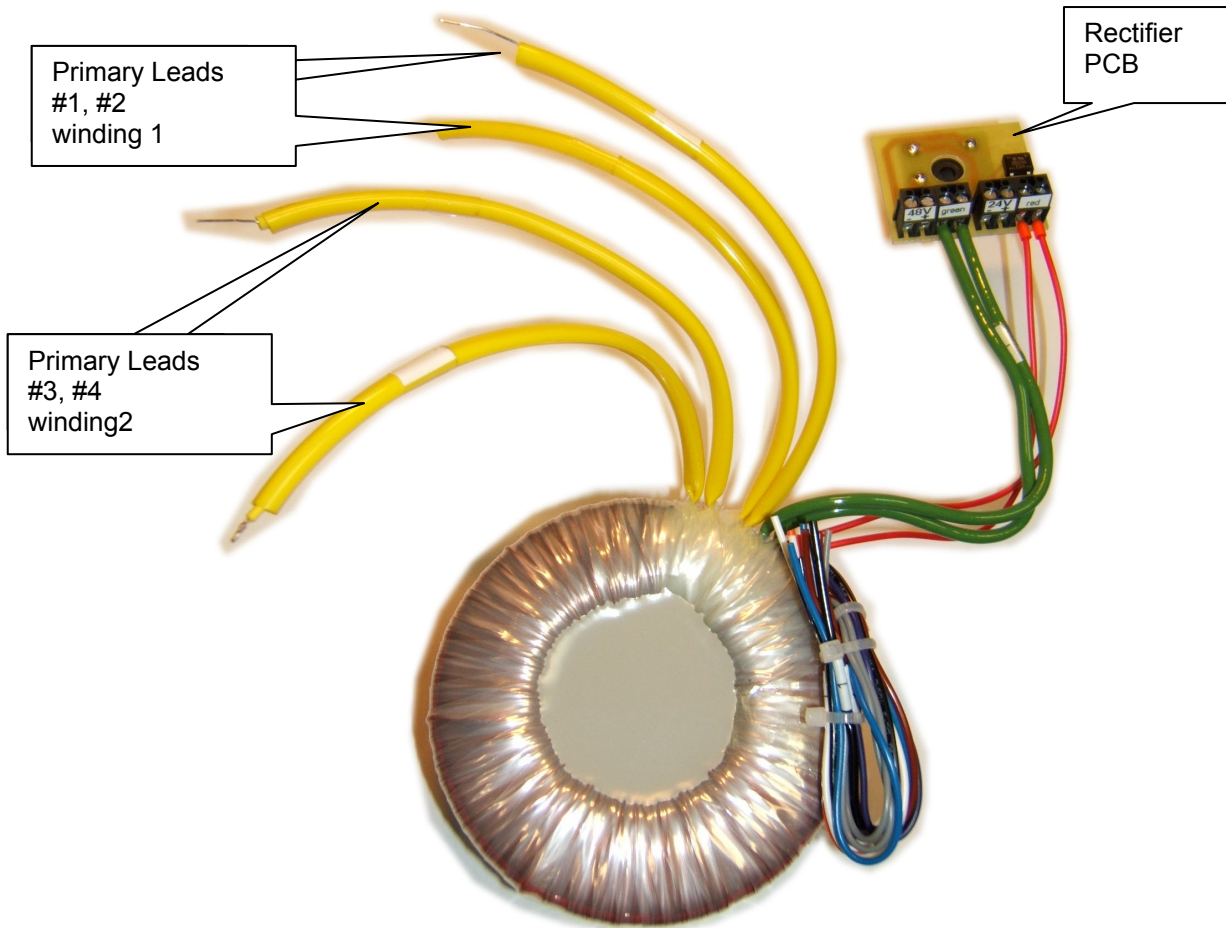
This device was developed for use in industrial environments. For trouble-free operation and to reduce emitted interference, the following should be observed during wiring of the equipment:

- The EMC of a machine or device is affected by all connected components (motor spindle, length and type of cables, wiring, etc.). Under certain conditions the use of additional filters can be necessary to maintain the current laws.
- The earth and shield connections of all those devices used in conjunction with the frequency converter should be as short as possible and have as large a cross-section as possible.
- Control devices used with the frequency converter (PLC, CNC, IPC) should be connected to a common earth/earth terminal bar.
- Supply cables, motor cables and control cables must be completely isolated from each other. Where crossing cannot be avoided, cables should be laid at 90° to each other.
- The control cable should be laid as far away as possible from the load cable.



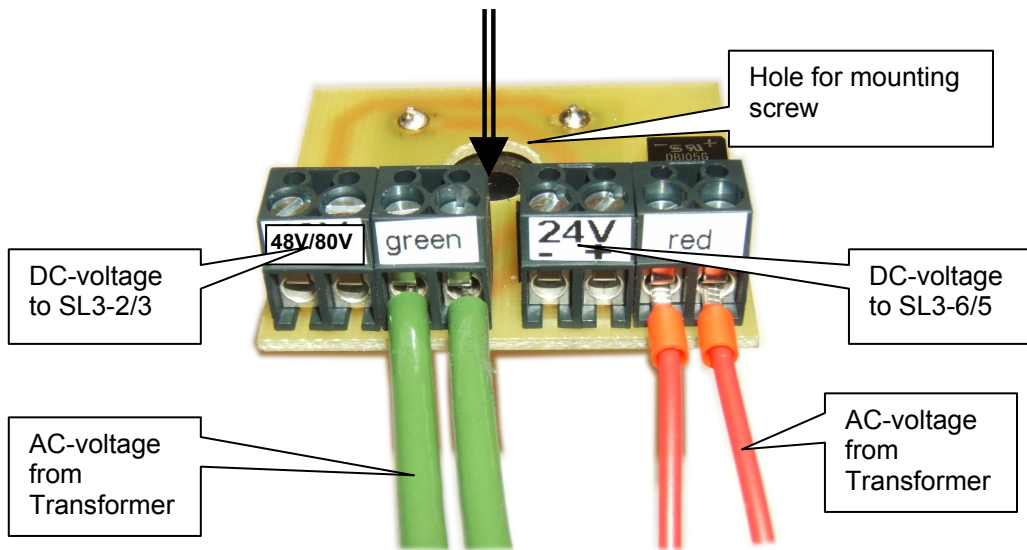
## 9. Power Supply and Rectifier Connection (as option)

As option a power supply set is available, consisting of a transformer and a rectifier board. With this set it is possible to generate the required DC-voltages for the power supply of the SFU0154-1.



For mounting purpose the transformer has on the bottom side a thread for a 5mm screw. It is recommended to use a solid mounting plane and a proper fixing due to the weight.

## Rectifier Connection and Mounting



Due to the possibly high current to be drawn, the rectifier board has to be mounted to a heat sink or solid a metal mounting plane for good cooling. A mounting hole for a 4mm screw is provided. Please use washers in order not to damage the rectifier housing



**Attention: Please provide good cooling of the rectifier!**

## Mains Voltage Connection

The transformer has two primary windings (yellow #1-#2, #3-#4) in order to be set up for 110/115V and 220/230V mains networks.

**115V:** For 110/115V mains networks the primary transformer windings have to be connected **in parallel**: Connect the phase to the yellow wire #1 and #3  
Connect the neutral to the yellow wires #2 and #4 of the transformer.

**230V:** For 220/230V mains networks the primary transformer windings have to be connected **in series**. Connect yellow wire #2 with #3,  
Connect the phase to the yellow wire #1 and the neutral wire to the yellow wire #4.



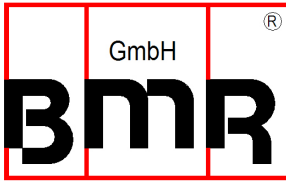
### Attention:

**All these works handle with dangerous voltages and have to be carried out by skilled persons only.**

**Please verify before connecting that the mains voltage is switched off!**

**Please verify that the power supply connections are carried out according the correct mains voltage. An incorrect connection of the transformer to the mains network will cause an immediate destruction of the transformer and the thereto connected devices!**





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