

Frequency Converter SFU0601 (SSE)



Frequency Converter SFU0601 (19")



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1. Introduction

Depending on its construction, the speed of a three-phase a.c. motor is directly dependent on the number of poles and the frequency of the network. In a 3ph 380V/50Hz network, with a 2-pole motor, the rated speed would be $50 \text{ U/s} * 60 = 3000 \text{ Upm}$.

Three-phase a.c. motors provide numerous benefits in industry, such as brushless operation, freedom from wear and tear, favourable capacity/weight ratio, high-speed capability, and much more. These motors can be used many different application areas, such as milling and grinding spindles, or with drilling machinery, for example.

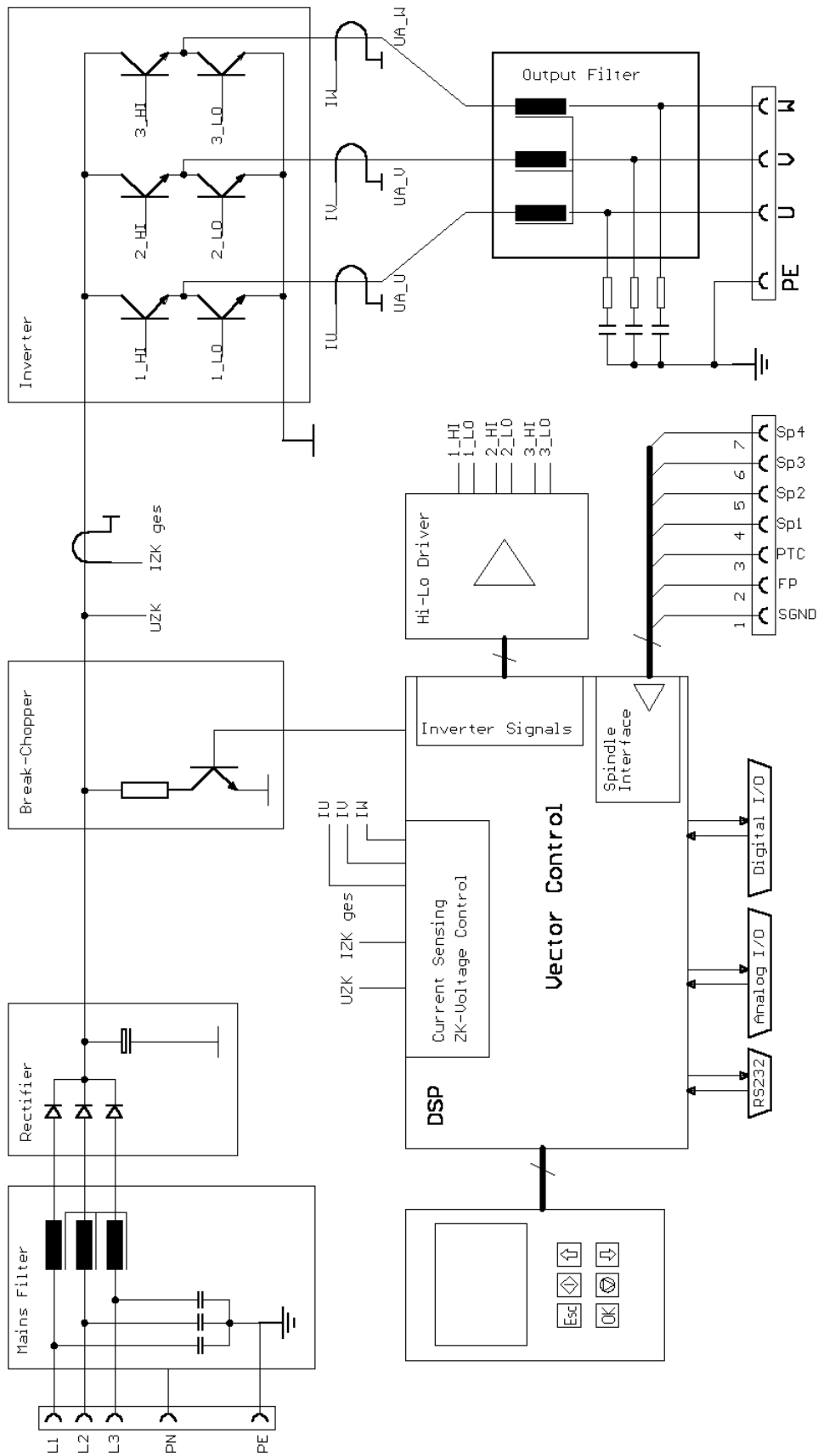
In the aforementioned applications, three-phase a.c. motors are operated using special control gear – frequency converters. These frequency converters convert the fixed 50 Hz network into a 3-phase network with variable frequency and voltage. This greatly reduces the start-up problems and the high starting currents that are inevitable when high-capacity three-phase a.c. motors are connected to a fixed network. The motor is controlled according to a special characteristic curve until its rated speed has increased, or it has been braked to a standstill.

The **SFU-0601** series frequency converter has been specially designed for use in these high frequency applications, offering excellent safety, performance and reliability, the result of years of experience in the design and construction of frequency converters, together with the use of the latest materials and the most reliable components. It can be used in many different applications and is as equally suitable for use as a replacement device in existing systems with older type series as it is in pre-planned applications as a cost-effective solution, helping to prolong the useful life of tools.

2. Description and Features

- The frequency converter SFU AC/DC-0302 allows **speed frequencies** up to **180,000Upm** with 2-pole a.c. motors.
- **High output power (2kVA@230V / 1kVA@115V)** from a **compact design**
- At the heart of the **SFU-0601** lies a **Digital Signal Processor (DSP)**, which generates all output variables and captures signals.
- All parameters, such as current, voltage and frequency, are captured in **real time**, and adjusted by implementing via the **Vector Control** according to loading.
- **Highly-accurate sinusoidal** output signals with low harmonic distortion, facilitate the smooth running of a.c. motors/spindles under all operational conditions.
- The **highest efficiency** of motors at **both low and high frequencies** is made possible.
- High level of **operational safety**. All operating states such as acceleration, operation at rated speed, and deceleration, are monitored and critical statuses are intercepted and brought under control. This also includes the **controlled deceleration** of the motor / spindle in the event of power failure or Emergency Stop.
- **Integrated braking resistor** for reduced external wiring.
- **Transparency**: The user is continuously informed of the status of the frequency converter and the motor / spindle by means of a 4-column plain-text display on the front panel.
- **Control**: The frequency converter can be manually controlled and calibrated as required using 6 keys on the front panel.
- **Individual adaptation** to the application in hand and the spindle in use. Up to 16 different spindle characteristics can be created and stored in the memory of the frequency converter, or existing characteristics can be modified and adapted to the application.
- **Diverse control and communication possibilities**. 3 types of connection are available to facilitate communication using peripheral devices - PC , PLC (Programmable Logic Control), CNC (Computer Numeric Control).
- **Straight-forward and flexible integration** into existing systems by means of open configuration of I/O signals for control and configuration:
Control inputs: 3 analogue, 8 digital
Control outputs: 3 analogue, 8 digital (relay)
- **Galvanic separation** of all interfaces from each other and from the network / motor potential
- **Short-circuit-protected**
- **User-friendly configuration** and control using optional Windows Software for the PC
- **Automatic spindle detection**, if supported by the spindle
- **Two Versions** available: 19" rack version called 19", and for cabinet mounting called SSE

3. Block Diagram



4. Technical Data

Supply connection	380V, 50Hz, 3Ph 5pol: R, S, T, PN, PE (L1,L2,L3) Screw Terminals 4mm ²	230V, 50Hz, 1Ph 3pol: L, PN, PE Screw Terminals 4mm ²
Output power	15 kVA (32 A mains fuse !)	7.5kVA (32 A mains fuse !)
Output voltage	3* 380V	3* 230V
Motor connection	4pol: R, S, T, PN	Screw Terminals 4mm ²
Output current	Electronically limited	
Over-current	max. 10s	
Output frequency	3kHz / 180.000 rpm	
Spindle characteristics	max 16, stored internally, freely definable	
Spindle sensor inputs	PTC, magneto-resistor, logic (D-Sub 15-pin fem.)	
Control inputs	3 analogue: 0-10V, galvanically separated :	(D-Sub 25-pin fem.)
Control inputs	8 digital: 0-24V, galvanically separated:	(D-Sub 25-pin fem.)
Control outputs	3 analogue: 0-10V, galvanically separated	(D-Sub 25-pin fem.)
Control outputs	8 digital: relay outputs, 24VDC/1000mA, 125VAC/500mA	(D-Sub 25-pin fem.)
Interface	RS232 galvanically separated, 9600Bd	(D-Sub 9-pin male)
Housing dimensions (SSE)	Width: 165mm, Height: 385mm (455mm) , Depth: 195mm	
Housing dimensions (19" Rack Version)	Width: 445mm (485mm), Height: 177mm (4HE) , Depth: 295mm	
Weight	SSE: 9 kg 19" : 11kg	
Protection	IP20	
Operating conditions	max. ambient temperature 40°C, no humidity	



CAUTION: To avoid severe motor / spindle damage, select correct motor / spindle characteristic !

5. Safety-Precautions and Warnings

- This device produces dangerous electrical voltages and is used for the operation of dangerous moving mechanical parts. For this reason, only professionally trained and qualified personnel should be allowed to install and repair 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.

6. Connections, Interfaces and Pinouts

- Operational parameters and outputs:
The **SFU-0601** covers all current important operational parameters and operating data. Up to 8 digital outputs can be used for signalling and up to 3 analogue values can be output to the analogue outputs (0-10V) .
- Remote Control and Outputs:
8 digital inputs (24V) and 3 analogue inputs (0-10V) are available for remote control of the **SFU-0601**.

These assignments can be freely configured. Using the optional Windows PC software "*SFU-Terminal*", the above assignments can be easily achieved, providing exceptional flexibility with each application (> see 8.).

Each operating parameter can be assigned as a signal and each control signal can be allocated the required I/O pin. In addition, the logic level (high or low active) can be individually defined. The same assignment is also possible for the analogue measured data and control data at the analogue I/O pin.

The standard allocations of operational parameters, their outputs, control signals and inputs, are listed in the following table.

6.1 Digital Inputs and Outputs (D-Sub 25pin fem.) (on frontpanel at SSE-version, on backpanel at 19"rack-version)

Pin	Description	Function / default message	Function / User Message
1	Relay 1..8 kontakt	(für alle gemeinsam)	
14	Relay 1..8 kontakt	(für alle gemeinsam)	
2	Relay 1 opener	overload	
15	Relay 2 opener	overtemperature converter	
3	Relay 3 opener	overtemperature spindle	
16	Relay 4 opener	converter ready	
4	Relay 4 closer	converter ready	
17	Relay 5 opener	Spindle ready	
5	Relay 5 closer	Spindle ready	
18	Relay 6 closer	converter runs at duty rpm	
6	Relay 7 closer	spindle runs at duty rpm	
19	Relay 8 closer	Standstill	
7	NC		
20	auxiliary power supply	+24V / 100mA	
8	auxiliary power supply	+24V / 100mA	
21	GND digital		
9	GND digital		
22	NC		
10	Digital Output 2	Input Lock (Emergency Off)	
23	Digital Output 1	rectangular pulses from hall sensor	
11	Digital Input 6	reserved	
24	Digital Input 4	reserved	
12	Digital Input 3	reserved	
25	Digital Input 1	start extern	
13	Digital Input 5	reserved	

- The digital outputs (relays 1...6) are galvanically separated contacts (500V isolation).
D.C.: 24V / 1000mA A.C.: 125V / 500mA
- Digital input switching level: "0" 0...7V "1" 18...24V
- The digital inputs require a high level of 24 V for correct function (PLC standard level).
- Hall sensor output level: 0-24V (24V level.)
- The +24V output can be used as a power supply for this type of electronic spindle interface.

6.2 Analogue Inputs and Outputs (D-Sub 15pin fem.) (on frontpanel at SSE-version, on backpanel at 19"rack-version)

Pin	Description	Function default	Function
1	GND analogue		
9	Analogue Input 1	duty rpm	
2	GND analogue		
10	Analogue Input 2	reserviert	
3	GND analogue		
11	Analogue Input 3	reserviert	
4	GND analogue		
12	Analogue Output 1	duty rpm local	
5	GND analogue		
13	Analogue Output 2	actual rpm spindle	
6	GND analogue		
14	Analogue Output 3	effective load in percent	
7	GND analogue		
15	Analogue Output Ref	reference voltage +10.00V	
8	GND analogue		

- Analogue input voltage range: 0...10V
- Analogue output voltage range: 0...10V

6.3 RS232 (D-Sub 9pin male. on frontpanel at SSE-version and 19"rack-version)

Pin	Description	Function
2	RxD	receive-data (data to converter)
3	TxD	send-data (data from converter)
5	GND	Ground

use a standard zero-modem-cable for connection to PC