

 operating instructions

**QUICK START GUIDE**

**Frequency converter  
VAU 7.5/3**



28100241401 03/2014

## Safety information



### Warning of electrical shock! Danger to life!

Electrical shock can cause serious injury or even death of persons. The frequency converter can be damaged as well.



### Warning of danger of other types! Risk of injury!

Further sources of danger that can cause serious injury of persons. The frequency converter can be damaged as well.



### Warning of hot surfaces! Risk of injury!



### Warning of automatic start-up of the machine!



Detailed information can be found in the VAU 7.5/3 operating instructions.

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## VAU 7.5/3 → First steps



This quick start guide represents only an excerpt of the VAU 7.5/3 operating instructions. The latter should be read thoroughly before initial start-up.

The quick start guide contains safety instructions and helps the user to put the basic model of the VAU 7.5/3 into operation and to operate it with the default settings.

### Intended use



Frequency converters are components that are intended for installation into electrical systems or machines.

When being installed into machines, the commissioning of the converters (i.e. running in normal operation) is not permitted until it has been determined that the machine at the date of commissioning complies with the relevant machinery directive including the EMC directive; EN 60204 must be observed.

The frequency converters comply with EC Machinery Directive 2006/42/EC.

The technical data as well as the specifications of the technical connection conditions can be found both on the specification plate and in this manual and must be observed.

## Preparatory measures



All tasks for transport, installation and commissioning as well as for servicing should be carried out by **qualified technicians (IEC 364 or CENELEC HD 384 or DIN VDE 0100 and IEC 664 or DIN VDE 0110 and national accident prevention regulations)** .

Qualified technicians are persons that are familiar with the setting up, assembly, commissioning and operation of the product and have the appropriate qualifications for their tasks.

## Setting up



The setting up and the cooling of the devices need to be done according to the directives of the corresponding pump documentation.

The frequency converters need to be protected against excessive strain. In particular, components must neither be bent nor insulation dimensions changed during transport and handling. Avoid touching electronic components and contacts.

Frequency converters contain electrostatically-endangered components that can be easily damaged by improper handling. Electrical components must neither be damaged mechanically nor destroyed (possible health hazard!).

## Electrical connection



Frequency converters are components for use in industrial high-voltage systems and are operated with voltages that can cause serious injuries or even death if touched.

Installations and maintenance may only be done by **qualified electricians** and when the device is free of voltage. The operating instructions have to be available for these persons at all times and be dutifully observed by them.

On the circuit boards there are highly sensitive MOS semiconductor devices that are especially sensitive to static electricity. Therefore, please avoid touching the circuit boards or components with your hands or with metallic objects. Only the screws of the terminal strips may be touched by insulated screwdrivers when wires are connected..



The frequency converter is intended for permanent connection only and may not be operated without an effective earth connection that complies with the local regulations for high leakage currents (> 3.5 mA). VDE 0160 prescribes the laying of a second earth line or an earth cross-section of at least 10 mm<sup>2</sup>

If personal or fire protection is required when using the FC, all-current sensitive residual-current devices (type B RCD) must be used (in accordance with VDE 0664). They provide reliable protection for the high-frequency AC currents and the smooth and pulsating DC residual currents that occur during FC operation. Conventional type A residual-current devices are not suitable for this purpose.

When working on frequency converters that are electrically charged, the relevant national accident prevention regulations must be observed.

The local regulations on installing electrical systems as well as the accident prevention regulations must be observed.

The electrical installation is to be carried out according to the applicable regulations (e.g. cable cross-sections, fuses, earth lines).

Information on EMC-compliant installation – such as insulation, earthing, arrangement of filters and the laying of lines – can be found in the documentation for the frequency converters. Always observe these instructions also with CE-marked frequency converters. The responsibility of complying with the limits required by the EMC regulations lies with the manufacturer of the system or machine.

**Operation**



During operation, frequency converters can have – depending on their type of protection – electrically charged, uncovered, and possibly even moving or rotating parts, as well as hot surfaces.

The device is charged with dangerous voltage for up to 5 minutes after being switched off. Opening the device or removing the covers or the operating unit is not permitted until 5 minutes after the voltage to the device has been switched off. Before switching on the power supply voltage all covers need to be reattached.

Even if the motor is at a standstill (for instance because of electronic blockage, blocked drive or output terminal short circuit) the power cable terminals, motor terminals and terminals for the brake resistor may still carry dangerous voltages. A motor standstill does not mean that there is a galvanic separation from the mains.



**Notice**, under certain settings, the converter can start up automatically when switched on from the mains side.

Systems into which the frequency converters are installed must, if necessary, be equipped with additional monitoring and protective devices according to the relevant safety regulations, i.e. laws for technical tools and appliances, accident preventions regulations, and so forth.

There is a risk of serious injury for persons or material damage if required covers are removed without authorisation, if the device or its components are used improperly, or if installed or operated incorrectly.

Electrically charged parts and line connections must not be touched directly after frequency converters are disconnected from the supply voltage, as the capacitors may be charged. Observe the corresponding signs about this on the frequency converters.

During operation all covers must be kept closed.

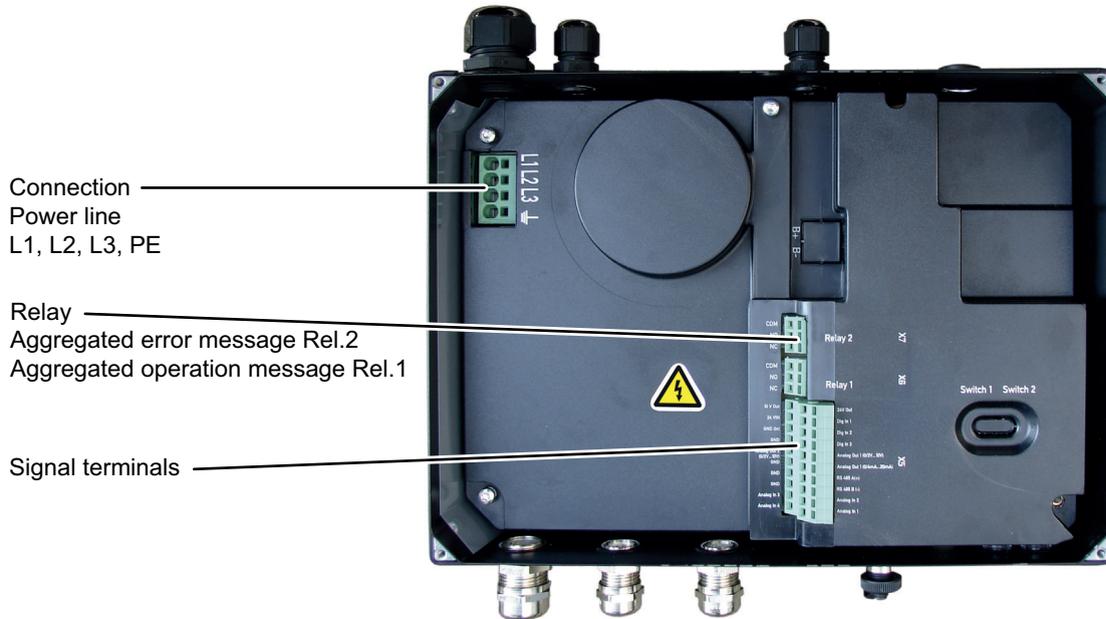
The frequency converter is maintenance-free under normal operating conditions. If the air is dusty, the cooling surfaces should be cleaned regularly with compressed air.

	<p><b>WARNING! DANGER TO LIFE!</b></p> <p>The power pack may still be charged with voltage for up to 5 minutes after being switched off from the mains. Converter terminals, motor feeder lines and motor terminals may carry voltage.</p> <p>Touching open or exposed terminals, lines and device parts can cause serious injuries and even death!</p>
	<p><b>CAUTION</b></p> <p>Children and the general public are prohibited from accessing the device.</p> <p>The device may be used only as intended by the manufacturer. Unauthorised modifications and use of spare parts and auxiliaries that are not sold or recommended by the manufacturer of the device can cause fires, electrical shocks and injuries.</p> <p>Store these operating instructions where they are easily accessible and place them in every user's hands.</p>
	<p>The heat sink and other metallic parts can reach temperatures of more than 70 °C.</p> <p>Keep sufficient space to neighbouring components.</p> <p>When working on the components allow for sufficient cooling time.</p>

<p><b>Warning:</b></p>	<p>This is a product of the limited sales class acc. to IEC 61800-3. In a residential environment this product can cause high-frequency interferences, in which case the user can be required to take suitable measures.</p> <p>A suitable measure would be the employment of a recommended line filter.</p>
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## Commissioning

After opening the terminal box cover you will find all the connection terminals of the frequency converter in the connection area.



### Connection Power line

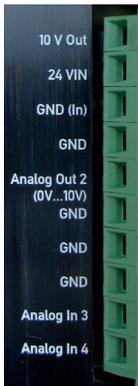
Conductor cross-section of the mains power supply: 0,25–4 mm<sup>2</sup> (wire-end ferrule with plastic shroud)  
Stripping length: 15 mm

	Terminal	Connection
	L1, L2, L3	Mains power supply phase L1, L2, L3
	PE	Mains power supply earth line PE

### Signal terminals

Conductor cross-section of the signal lines: 0,25 - 1,5 mm<sup>2</sup> (wire-end ferrule with plastic shroud)  
Stripping length: 7 mm

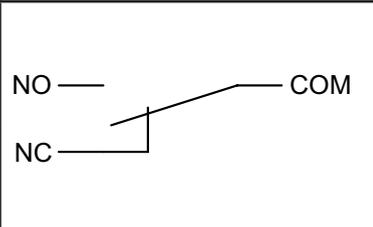
Connection terminals of the bottom row of the double-decker terminal block:

	Terminal	Connection
	10 V Out	Int. voltage supply
	24 V IN	Ext. voltage supply
	GND (In)	Ground (ext. voltage supply)
	GND	Ground
	Analog Out 2 (0 V...10 V)	Analog voltage output
	GND	Ground
	GND	Ground
	GND	Ground
	Analog In 3	Analog input 3
	Analog In 4	Analog input 4

Connection terminals of the top row of the double-decker terminal block:

	Terminal	Connection
	24 V Out	Int. voltage supply
	Dig In 1	Setpoint value enable
	Dig In 2	Programmable P 156
	Dig In 3	Programmable P 157
	Analog Out 1 (0 V...10 V)	Analog voltage output
	Analog Out 1 (4 mA...20 mA)	Analog current output
	RS 485 A(+)	Serial interface RS485 line A
	RS 485 B(-)	Serial interface RS485 line B
	Analog In 2	Analog input 2
	Analog In 1	Analog input 1

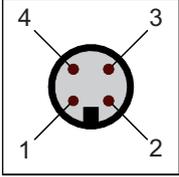
### Relais

Function	Description	
	Relay 1 AOM	Aggregated operation message. Device stands still: COM - NC The device is turning at a speed > 0: COM - NO
	Relay2 AEM	Aggregated error message. Fault-free operation: COM - NC Malfunction: COM - NO

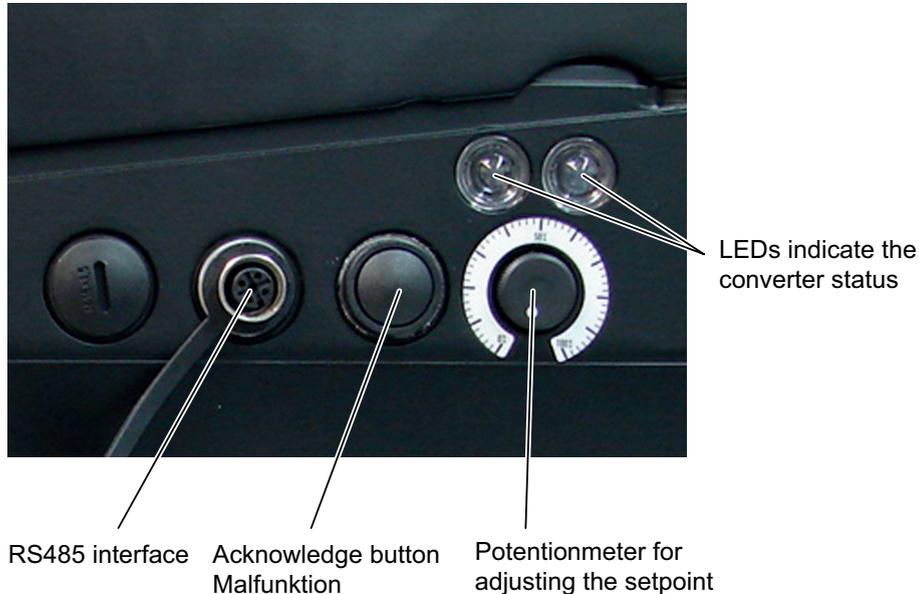
	<b>NOTE</b>
	All control voltages refer to a common reference potential (GND). 24 V can be taken from the respective terminals. The sum of the currents may not exceed 100 mA.

## RS485 interface

The RS485 interface is designed as a two-wire model acc. to EIA RS485 (data lines A and B) and provides the communication with the frequency converter.

Pin assignment	M12	Description	 <p>Pin (bus in)</p>
M12:	1	24 V	
	2	RS 485 A(+)	
	3	GND	
	4	RS 485 B(-)	

The local operation of the device is done on the operating panel as shown.



Using the potentiometer, the current setpoint value can be increased or decreased.  
 A malfunction can be acknowledged by pressing the Acknowledgement button.  
 A red LED indicates a malfunction.

Table of the **LED-flash codes**

Red LED	Green LED	Status
○	●	Initialisation
○	●	Operation
●	○	<b>Malfunction</b>
☀	●	With optional BUS module: BUS module is ready for operation
☀	●	With optional BUS module: BUS operation (active BUS connection)
<b>Legend:</b> ○ LED off, ● LED on, ☀ LED flashes, ☀ LED flashes quickly		

fault see → **KombiTool** diagnosis or read out P01011...1014  
 → Display **handheld**

Malfunction, Fault message		
Kombi Tool	Handheld, Error no.	fault
<b>Error group 1 P1011</b>		
1	1	Undervoltage 24V electronic
2	2	Overvoltage 24V electronic
128	8	Internal communication not ok
512	10	Parameter set not complete
1024	11	System error, missing mains voltage
4096	13	Cable breakage Analog In 1 (4-20mA /2-10V)
8192	14	Cable breakage Analog In 2 (4-20mA / 2 -10V)
16384	15	Blockage
32768	16	Alarm 1 (DigIn parameterised)
<b>Error group 2 P1012</b>		
1	17	Alarm 2 (DigIn parameterised)
16	21	Bus Timeout
32	22	Max. automatic fault acknowledge exceed
64	23	External error 1
128	24	External error 2
<b>Error group 3 P1013</b>		
1	32	Short circuit
2	33	Overvoltage intermediate circuit
4	34	Undervoltage intermediate circuit
8	35	Overtemperature motor
16	36	Mains interruption
64	38	Overtemperature powermodul FC
128	39	Over current FC
256	40	Inner temperature FC too high
1024	42	I <sup>2</sup> T motor protection cut off
2048	43	Earth fault
8192	45	Motor connection defective
16384	46	Motor parameter not ok
32768	47	Controller parameter not ok
<b>Error group 4 P1014</b>		
1	48	No motor data (delivery status)
2	49	Overload

## Technical specifications

Function		Description
Rated motor power	[kW]	7,5
Mains voltage		3 AC 400V-15%...480V+10%, 50/60 Hz
Rated / input current	[A]	17,8
Short time max. current	[A]	26,7 (150% I <sub>N</sub> ) for 60 sec.
Output frequency	[Hz]	0 - 400
Protection functions		overvoltage, undervoltage, I <sub>2</sub> t- limitation, short circuit, motor temperature, FC temperature, motor current limitation
Ambient temperature at rated power	[°C]	-10...+50
Altitude		Up to 1000 m over sea level over1000 m with reduced power (1% per 100 m) (max. 2000 m)

Function		Description
Protection class		IP55
Dimensions (L x W x H)	[mm]	307x233x181
Weight incl. adapter plate	[kg]	8,7
Switching frequency of the power stage	[kHz]	4, 8, 16, (default setting 8)
EMC certificates according to DIN EN 61800-3; VDE 0160-103:2005-07		C2

Inputs and outputs	Description
Digital input 1...3	Switching level Low < 5V / High > 15V I <sub>max</sub> (at 24V) = 3mA; R <sub>in</sub> = 8,6kΩ
Analog input 1...4	0 / 2 ... 10V oder 0 / 4 ... 20mA resolution 10 Bit; R <sub>in</sub> = 10kΩ
Relay 1; 2	Change over contact (NO/NC) Max. switching power: - for resistive load (cos φ = 1): 5 A at ~230 V or = 30 V - for inductive load(cos φ = 0,4 und L/R = 7 ms): 2 A at ~ 230 V or = 30 V Max response time: 7 ms ± 0,5 ms Electrical lifetime: 100 000 switching cycles
Analog output 1(current)	- Short circuit proof - I <sub>out</sub> = 0..20mA - Load = 500Ω
Analog output1 (voltage)	- Short circuit proof - U <sub>out</sub> = 0..10V - I <sub>max</sub> = 10mA
24 V DC fixed voltage output	- Auxiliary voltage U = 24V DC - Short circuit proof - I <sub>max</sub> = 100mA - external supply of 24 V possible
10 V DC fixed voltage output	- Auxiliary voltage U = 10V DC - Short circuit proof - I <sub>max</sub> = 30mA

The VAU7.5/3 frequency converter is equipped with a motor temperature monitoring (PTC).

## Certifications

European EMC guidelines



If the VAU7.5/3 frequency converter is installed and operated according to the recommendations of these operating instructions, it fulfils all requirements of the EMC regulations according to the EMC product standards for motor driven systems EN 61800-3.



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