

# **VARIBLOC® Variable Speed Gear Unit and Options**

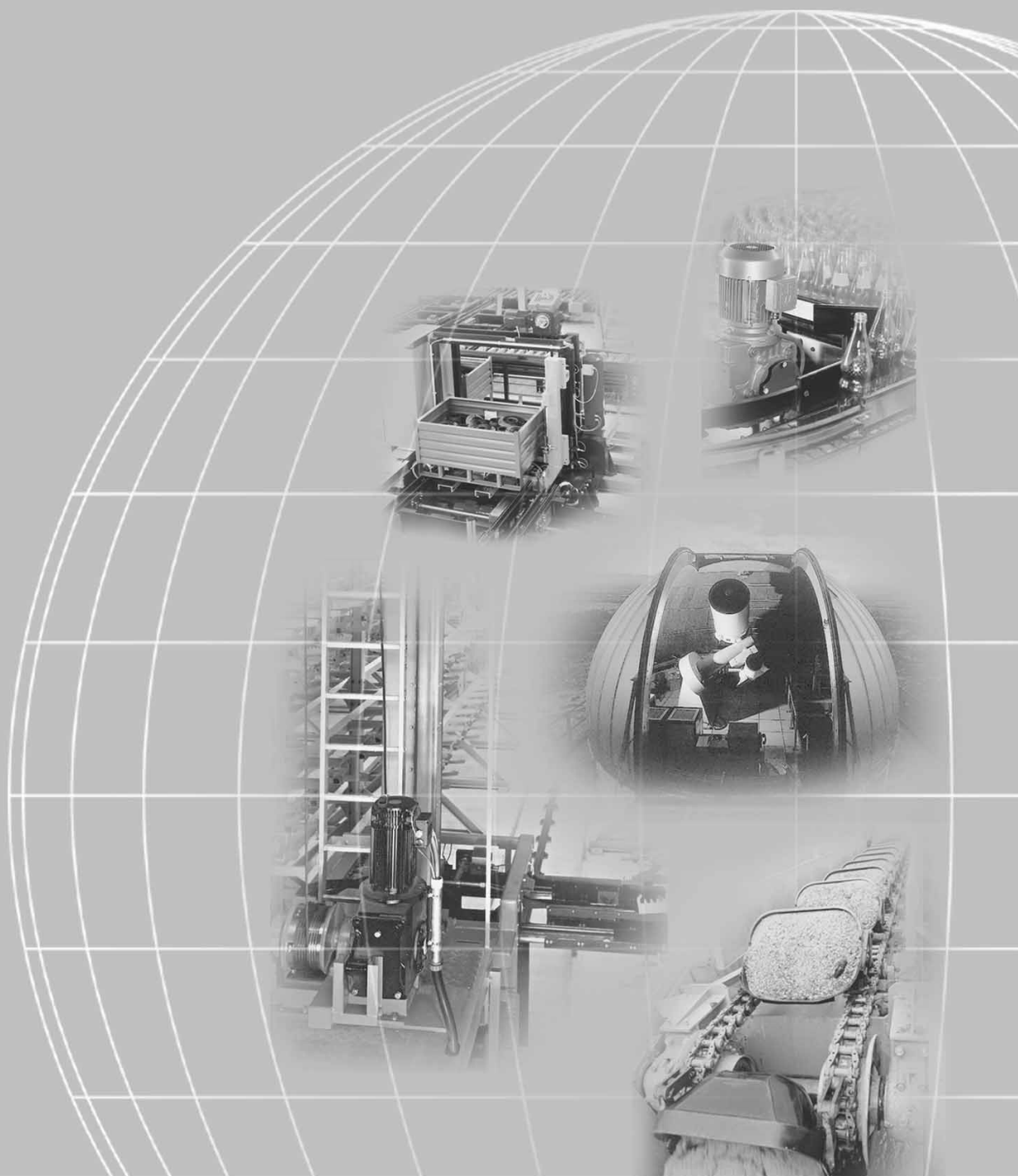
**Edition**

*09/2000*

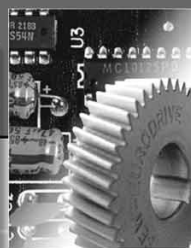


**Operating Instructions**

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**SEW-EURODRIVE**





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## 1 Important Notes

### **Safety and warning instructions**

**Always follow warnings and safety instructions in this publication!**



#### **Electrical hazard**

Possible effects: Serious or fatal injury.



#### **Immediate danger**

Possible effects: Serious or fatal injury.



#### **Dangerous situation**

Possible effects: Minor injury.



#### **Harmful situation**

Possible effects: Damage to equipment or surroundings.



Application hints and useful information.



Close adherence to these instructions is required for fault-free operation and fulfillment of any warranty claims. Read these instructions carefully before you start operating the drive!

These operating instructions contain vital servicing information and should be stored next to the drive unit.

### **Disposal**



**(Please observe all applicable regulations):**

- Housing components, gear wheels, shafts and rolling bearings of gear units should be disposed of as steel scrap. This also applies to components made of cast iron if no separate collection is available.
- The wide V-belt may be disposed of as residual waste.

Revisions to edition 7/95 are indicated by a gray bar in the margin.



## 2 Safety Notes

### **Preliminary remarks**

The following safety notes refer to the use of variable speed gear units.

When using **variable speed geared motors**, please observe safety notes for gear units and motors in the appropriate operating instructions.

**Please refer to the additional safety notes in the individual sections of these operating instructions.**

### **General**

**All tasks related to transport, storage, installation/assembly, connection, startup, service and maintenance may be performed by qualified technical personnel only with strict adherence to:**

- detailed operating instruction(s) and block diagrams
- warning and safety labels on the gear unit/geared motor
- system-specific regulations and requirements
- national/regional safety and accident prevention regulations

**Serious personal injuries and material damage may occur through**

- incorrect use
- improper installation or operation
- inadmissible removal of required protective covers or of the housing

Be aware that variable speed geared motors/gear units contain live and moving components and that some surfaces may get hot during and after operation.

### **Intended usage**

These variable speed geared motors/variable speed gear units are intended for industrial systems. They comply with existing standards and regulations. The technical data and information on approved operating conditions can be found on the nameplate and in the documentation.

All details must be strictly observed!

### **Transport / Storage**

**Inspect the shipment for damages upon receipt. Inform the shipping company immediately of any damages. In case of damages, startup may have to be cancelled.**

Securely tighten lifting eyebolts. The eyebolts are specifically designed for the weight of the geared motor/gear unit; no additional loads may be applied.

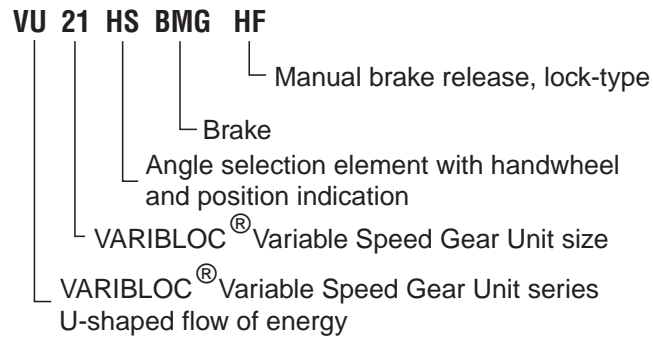
If necessary, use appropriate and sufficiently dimensioned handling equipment. Remove existing shipping braces prior to startup.



### 3 VARIBLOC® Design

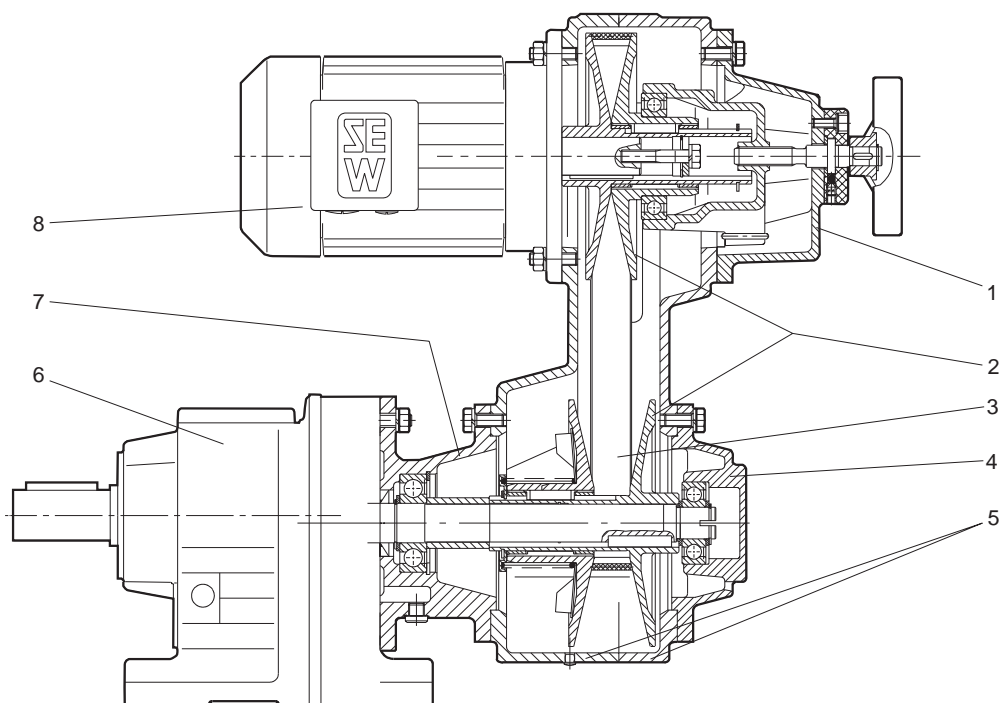
#### 3.1 Type designation

##### Example



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#### 3.2 VARIBLOC® variable speed gear unit – unit design



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Figure 1: VARIBLOC® design

- 1 Adjustment device front adjustment
- 2 Adjustment discs
- 3 Wide V-belt
- 4 Bearing cover
- 5 Two-part housing, variable speed gear unit
- 6 Coupled reduction gear unit
- 7 Output flange
- 8 Drive motor



### 3.3 Overview of VARIBLOC® mounting options

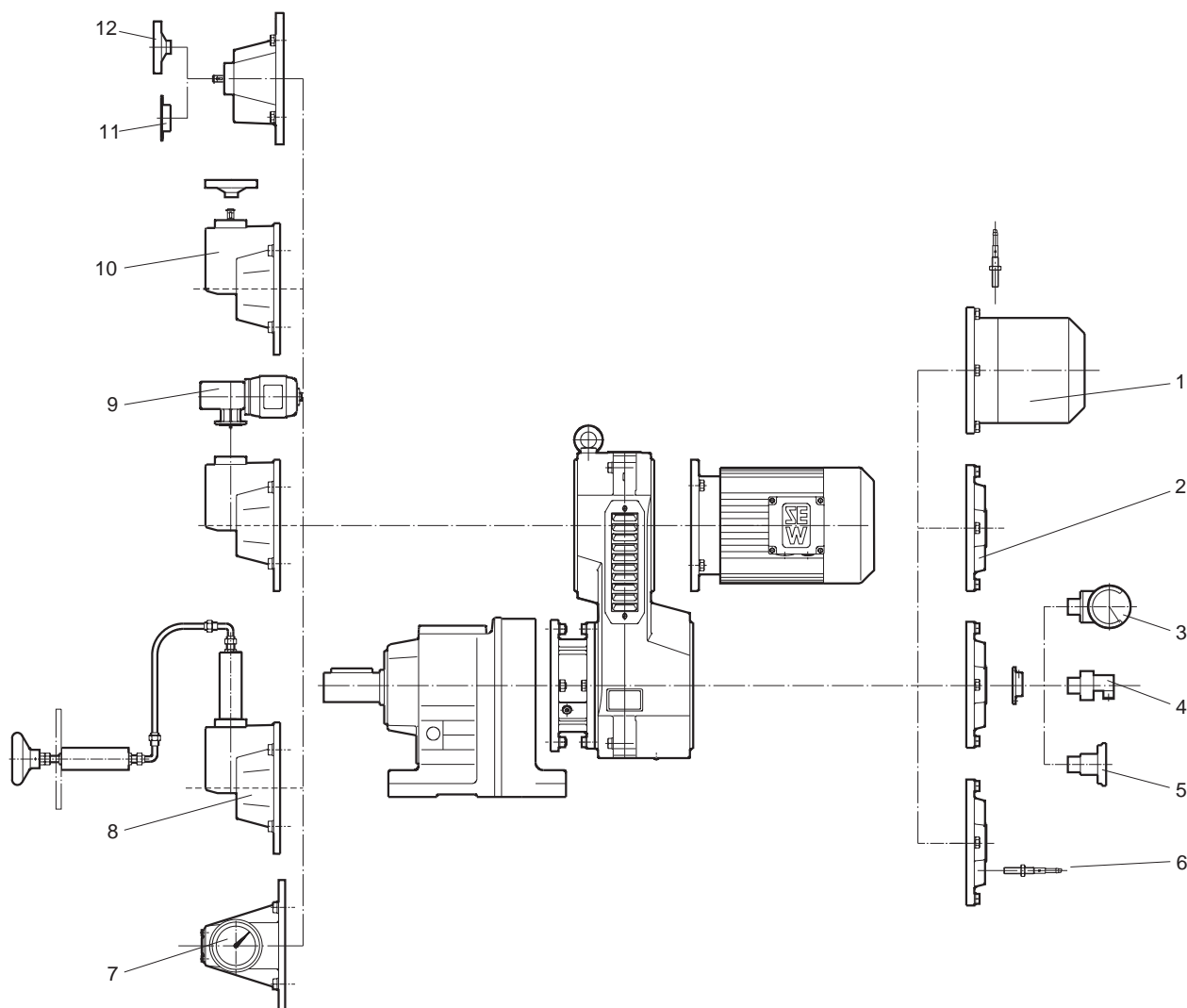


Figure 2: Overview of VARIBLOC® mounting options

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- 1 Brake BM(G) (with IG voltage pulse encoder)
- 2 Bearing cover
- 3 Right-angle tachometer TW
- 4 AC tachogenerator GW
- 5 Axial tachometer TA
- 6 Voltage pulse encoder IG
- 7 Adjustment device with handwheel and position indication HS
- 8 Hydraulic variable speed unit HY
- 9 Electromechanical remote speed adjustment EF
- 10 Adjustment device with handwheel H / with free shaft end NV
- 11 Front adjustment with sprocket wheel
- 12 Front adjustment with handwheel (standard design)



## 4 Installation



**Never adjust variable speed gear unit at standstill! (Damages to the adjustment device and the wide V-belt may result)**

### 4.1 Before you begin

**The drive may only be installed if**

- the entries on the nameplate of the drive match the supply voltage
- the drive is not damaged (no damage resulting from transport or storage)
- the following requirements have been properly fulfilled:
  - ambient temperature between 0 °C and +40 °C,
  - no oils, acids, gases, vapors, radiation, etc.
- the degree of protection provided by the enclosure has been checked

### 4.2 Preliminary work

**Variable speed gear units**

Output shafts and flange surfaces must be completely free of anti-corrosion agents, contamination or other impurities (use a commercially available solvent). Do not let the solvent come into contact with the sealing lips of the oil seals or the wide V-belt – damage to the material may result!

**Please note:**

- The service life of the lubricant in the bearings is reduced if the unit is stored for more than one (1) year.
- The enclosed wide V-belt must be installed.

### 4.3 Installation of VARIBLOC®

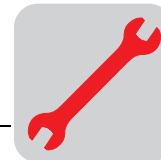
- The variable speed geared motor may be mounted or installed only in the specified position on a level<sup>1)</sup>, vibration-free and torsionally rigid support structure. Do not tighten housing legs and mounting flanges against each other.

**Please note:**

- VARIBLOC® design HS (handwheel with position indication) must be mounted so that the adjusting spindle is horizontal; otherwise the position indication will not function properly.
- **The breather valves must be easily accessible! The plastic plug of the condensate drain hole at the lowest position must be removed prior to operation (danger of corrosion!)**
- Carefully align the motor and driven machine to avoid overloading the motor shaft (observe approved overhung loads and axial forces!).
- Do not hammer or hit the shaft end.
- **Protect vertically mounted motors with an appropriate cover against penetration of foreign bodies or fluids! (cowl C)**

1) Maximum permitted flatness error for flange mounting (approximate value with reference to DIN ISO 1101): with → flange 120 – 600 mm max. error 0.2 – 0.5 mm





#### Installation in damp areas or in the open

- Ensure adequate supply of cooling air and that heated air from other units is not drawn in.
- VARIBLOC® gear units are supplied in corrosion-resistant versions (design B) for use in damp areas or in the open. Any damage to the paintwork (e.g. at the breather valve) must be repaired.
- Coat the threads of screwed cable glands and sealing plugs with sealant, and tighten well – apply another coat of sealant.
- Properly seal the cable entry.
- Thoroughly clean the sealing surfaces of the terminal box and terminal box cover before re-assembly. Replace porous seals!

#### Painting the gear unit

If the drive will be painted or partially repainted, ensure that the breather valve and oil seals are carefully covered with tape. Remove tape strips after the paint work is finished.

### 4.4 Required tools

- Wrench set
- Mounting device
- Shims and distance rings, if necessary
- Mounting materials for output components
- Multimeter

#### Installation tolerances

Shaft end	Flanges
Diametric tolerances in accordance with DIN 748 <ul style="list-style-type: none"> <li>• ISO k6 for solid shafts with <math>d, d_1 \leq 50</math> mm</li> <li>• ISO k7 for solid shafts with <math>d, d_1 &gt; 50</math> mm</li> <li>• Center hole in accordance with DIN 332, shape DR..</li> </ul>	Centering shoulder tolerances in accordance with DIN 42948 <ul style="list-style-type: none"> <li>• ISO j6 with <math>b_1 \leq 230</math> mm</li> <li>• ISO h6 with <math>b_1 &gt; 230</math> mm</li> </ul>

### 4.5 Mounting of output components

Figure 3 shows an example of a mounting device for mounting clutches or hubs onto shaft ends of variable speed gear units or motors. The thrust bearing on the mounting device may become redundant.

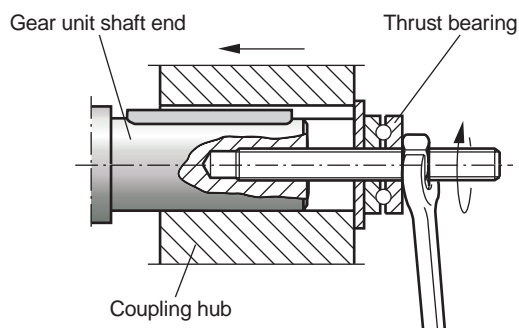


Figure 3: Example of a fitting tool

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## Mounting of output components

Figure 4 shows the correct mounting arrangement ② of a gear or sprocket wheel in order to avoid excessive overhung loads.

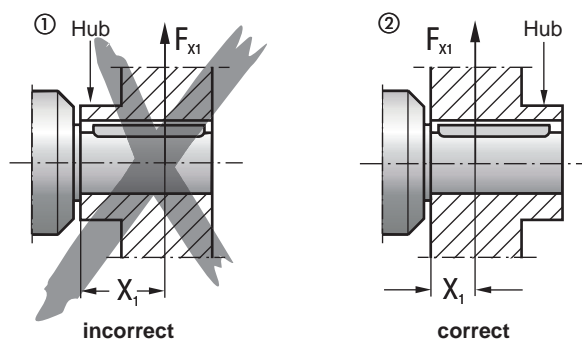


Figure 4: Correct mounting arrangement of a gear or sprocket wheel

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- Only use a mounting device (see Figure 3) for installing input and output elements. Use the center bore and the thread on the shaft end for positioning purposes.
- **Never drive belt pulleys, clutches, pinions, etc. onto the shaft end by hitting them with a hammer (damage to bearings, housing and the shaft!).**
- **Please observe correct tension of the belt for belt pulleys (in accordance with manufacturer's specifications).**
- Mounted transmission elements should be balanced and may not cause any unacceptable radial or axial forces (see Figure 4 / see "Geared Motors" catalog for approved values).



### Note:

Assembly is easier if you first apply lubricant to the output element or heat it up briefly (80–100 °C).

### Assembly of clutches

**While mounting clutches, the following items must be balanced in accordance with clutch manufacturer specifications:**

- Maximum and minimum clearance
- Axial offset
- Angular offset

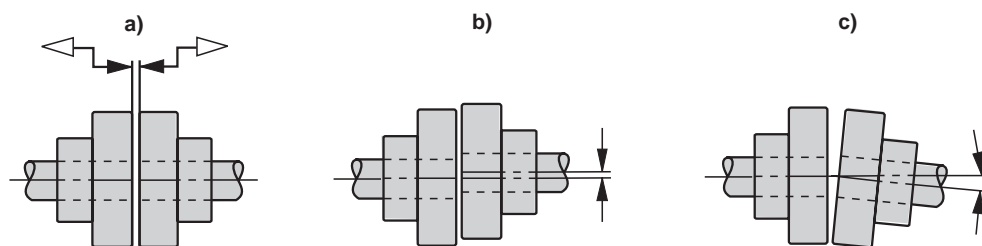
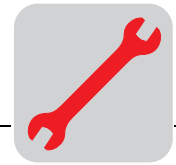


Figure 5

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Input and output elements such as belt pulleys, clutches, etc. must be equipped with a touchguard device!



## 5 Startup



Never adjust variable speed gear unit at standstill! (Damages to the adjustment device and the wide V-belt may result)

### 5.1 VARIBLOC® startup

Check the correct direction of rotation in the **disengaged** state (paying special attention to unusual sliding noises during racing phase).

Secure the key for the trial run without output components. Do not deactivate monitoring and protection devices – not even for the trial run.

If in doubt, modifications to normal operation (e.g. increased temperature, noises, vibrations) may require that the variable speed geared motor be switched off. Determine the cause and confer with SEW, if necessary.



## 6 Installation and Setup of Optional Equipment



**Never adjust variable speed gear unit at standstill! (Damages to the adjustment device and the wide V-belt may result)**

**Secure key for trial run without output components. Do not deactivate monitoring and protection devices – not even for the trial run.**

### 6.1 Installation and setup of EF/EFPA adjustment device

#### **Electromechanical remote speed adjustment EF, EFPA**

The electromechanical remote speed adjustment option consists of a variable speed motor featuring a display unit in the EFPA design. This display unit may be installed in a control cabinet. The display does not indicate speed changes due to load fluctuations.

#### **Note:**

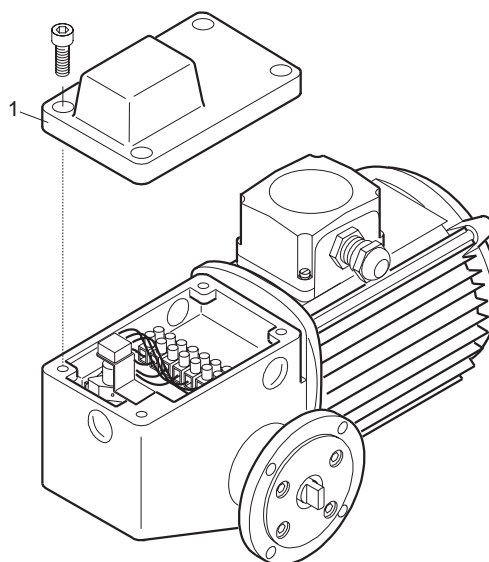
The electromechanical remote speed adjustment option EF, EFPA is designed for max. 40 % ED and a switching rate of  $\leq 20$  times per hour.



**Adjustments on EF, EFPA are done in the energized state!**

#### **Connecting the variable speed motor EF, EFPA**

1. Remove housing cover (1) from the switch element of the variable speed motor
2. Electrically connect the device
  - according to the enclosed wiring diagram
  - in accordance with the information on the nameplate
3. a) if desired, limit the speed range for variable speed motor EF (Section "Limiting the speed range for EF, EFPA" on page 14), otherwise replace housing cover
- b) for EFPA variable speed motor, connect the display unit according to the enclosed wiring diagram (Section "Connecting / adjusting display unit for EFPA" on page 13)



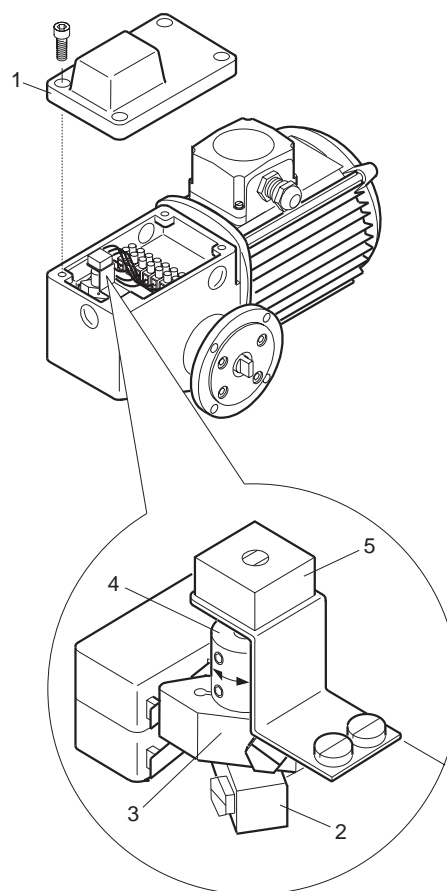
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Figure 6: Connecting variable speed motor EF, EFPA



## Connecting / adjusting display unit for EFPA

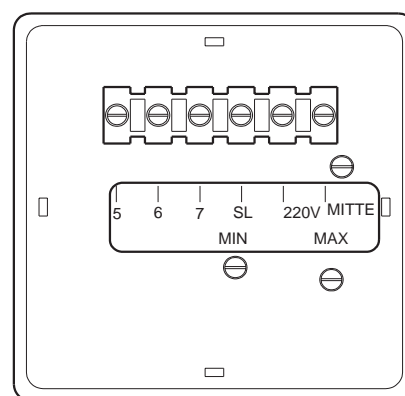
1. Set geared motor to desired maximum speed
2. Remove housing cover (1) from the switch element of the variable speed motor
3. Set potentiometer (5) of variable speed motor and secure (Figure 7):
  - loosen lower screw of coupling (4)
  - turn the potentiometer (5) at the coupling clockwise by approx. 15° until terminals 6 and 7 measure approx. 120 to 180 Ω
  - tighten lower screw of coupling (4)
4. Connect the display unit with supply voltage
  - Do not connect terminals 5, 6 and 7
5. Set display with potentiometer "Min" to 0 % (Figure 9)
6. Jumper display unit terminals 5 and 6
7. Turn potentiometer "Center" clockwise until it stops
8. Set display with potentiometer "Max" to 100 %
9. Remove jumper between terminals 5 and 6
10. Connect terminals 5 and 7 of the display unit with terminals 5 and 6 of the variable speed motor



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Figure 7: Adjusting potentiometer of variable speed motor

11. Adjust display with potentiometer "Center" in accordance with operating range R (Table 1 on page 14)
12. Connect display unit to the variable speed motor in accordance with enclosed wiring diagram
13. Adjust geared motor to desired minimum speed
14. Adjust display with potentiometer "MIN" in accordance with speed control range R (Table 1 on page 14)



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Figure 8: Adjusting the display

15. Adjust geared motor to desired maximum speed
16. Set display with potentiometer "MAX" to 100 %
17. Adjust geared motor to medium speed (display = 50 %)
18. If display does not read 50 %:
  - re-adjust display with "Center" potentiometer
  - repeat steps 13 through 16
19. If necessary, limit the speed range in accordance with the limit speeds listed under points 13 and 15 (Section "Limiting the speed range for EF, EFPA" on page 14)



Speed control range R	Setting values of potentiometer "Center"						
	VU01 VZ01	VU11 VZ11	VU21 VZ21	VU31 VZ31	VU41 VZ41	VU51	VU6
1:8		34 %	22 %	38 %			
1:6	32 %	35 %	27 %	28 %	35 %	38 %	
1:4							36 %
	Setting values of potentiometer "Min"						
1:8	13 %						
1:6	17 %						
1:4	25 %						

Table 1: Setting values of potentiometer "Center" and potentiometer "Min" in accordance with speed control range R

### Limiting the speed range for EF, EFPA

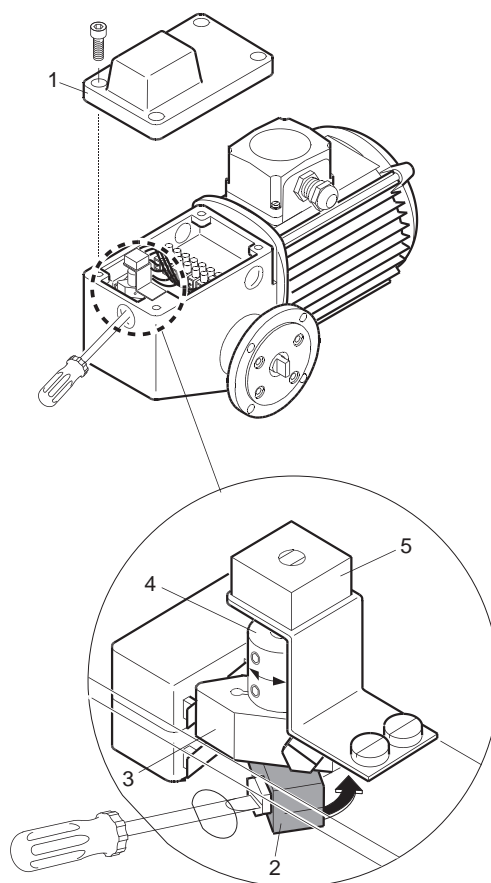


The operating cams for the limit switches are factory set so that the complete speed range of the variable speed geared motor VARIBLOC® can be used. It can be limited as follows (Figure 9):

#### Caution:

Limit the adjustment range only via limit switches – do not run motor to mechanical stop (potential material damage)!

1. Adjust VARIBLOC® to desired minimum speed
2. a) **Lower operating cam (2)**
  - loosen with screwdriver
  - turn counterclockwise until switching point is reached



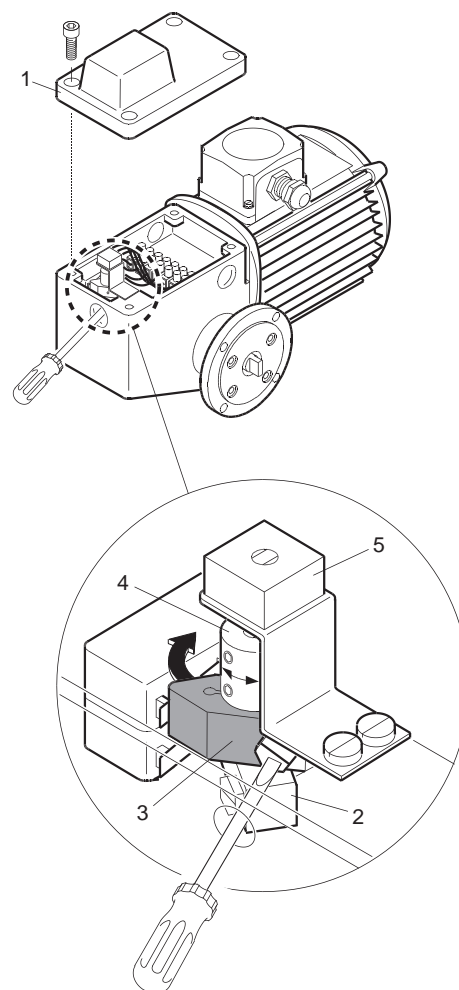
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Figure 9: Position and detail view of setting cam



for design with potentiometer (5) also  
(Figure 10):

- b) Loosen lower screw of coupling (4)
  - c) Turn potentiometer (5) on coupling
    - counterclockwise until stop is reached
    - clockwise by approx. 15 ° until terminals 6 and 7 measure approx. 120 to 180 Ω
  - d) Tighten lower screw of coupling (4)
3. Tighten lower operating cam (2)
  4. Adjust VARIBLOC® to desired maximum speed
  5. **Upper operating cam (3)**
    - loosen with screwdriver
    - turn clockwise until switching point is reached
    - tighten
  6. Install housing cover (1) (enclose wiring diagram)

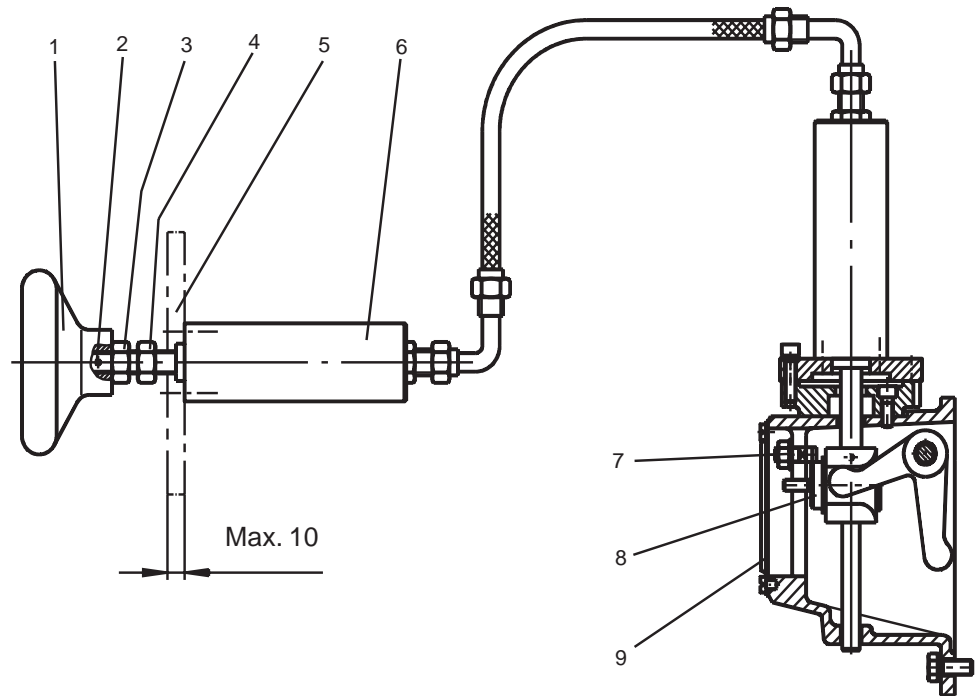


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Figure 10: Position and detail view of setting cams



## 6.2 Installation and setup of hydraulic adjustment unit HY



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Figure 11: Hydraulic adjustment unit

The hydraulic adjustment unit is a closed system. The required adjustment force is generated through the piston of the adjustment cylinder. This cylinder receives the response force (spring force) of the driven adjustment disc. The system is filled without enclosed air. The travel of the actuator cylinder corresponds to that of the positioning cylinder since both piston diameters are identical.

### Installing the positioning cylinder

The actuator cylinder is factory installed; high-pressure hose and positioning cylinder have to still be connected (bending radius of high-pressure hose  $\geq 40$  mm). The positioning cylinder may be mounted to a device wall in any position (Figure 11):

1. Remove pin (2) and handwheel (1)
2. Remove hex nuts (3 and 4)
3. Attach positioning cylinder (6) to device wall (5) using four M5 machine screws (according to DIN 912)
4. Reinstall hex nuts, handwheel and pin

### Limiting the speed range

The limit speeds are factory set so the complete speed range of the VARIMOT® geared motor can be used. It can be limited as follows (Figure 11):

1. Limiting high speed:
  - set the desired maximum speed
  - turn hex nut (4) clockwise and secure with hex nut (3)
2. Limiting low speed:
  - set the desired minimum speed
  - remove cover plate (9) and loosen hammer screw (7)
  - move hammer screw (7) up to the stop of the adjusting bolt (8)
  - tighten hammer screw (7)





### 6.3 Installation and setup of GW, IG, TW and TA

#### AC encoder GW, IG voltage pulse encoder

1. Use the AC encoder GW
  - for VU 01-51/VZ 01-41
2. Use the IG voltage pulse encoder
  - for VU 6 and for VU/VZ 01-41 with brake BMG

#### Installing the AC encoder GW (Figure 12)

1. Install the AC encoder (6) in the adapter (tachogenerator) (3)
  - tongue must fit in shaft slot (4)
2. Secure AC encoder (6) with threaded pin (2)

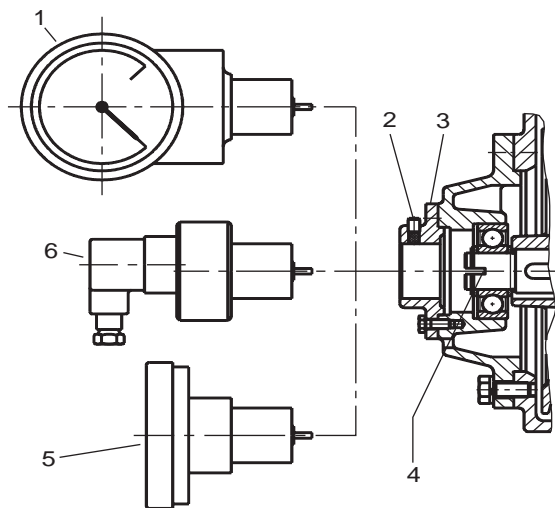


Figure 12: Installing AC encoder GW, right-angle tachometer TW, shaft tachometer TA

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#### Installing right- angle tachometer TW, shaft tachometer TA

The tachometers TW (1) and TA (5) can be installed instead of the AC encoder (Figure 12).

#### Connecting analog remote speed display FA, FD

The analog remote speed displays FA (with scale from 0 % to 100 %) or FD (with customized scale) are connected to the AC encoder GW.

1. Connect the device to an AC encoder in accordance with the terminal designation
2. Operate drive at maximum speed
3. Adjust the device to 100 % indicator deflection with the potentiometer on the back of the unit



**Mounting the  
voltage pulse  
encoder IG  
(Figure 13)**

1. Move bolt head (1) in front of bore for voltage pulse encoder (2)
2. Install voltage pulse encoder (2) into the appropriate thread of the geared motor housing until it touches the bolt head (1)
3. Turn back voltage pulse encoder (2) by two turns (clearance = 2 mm)
4. Secure voltage pulse encoder (2) with lock nut
5. If no display is present, correct input sensitivity:
  - increase or decrease clearance between voltage pulse encoder and bolt head

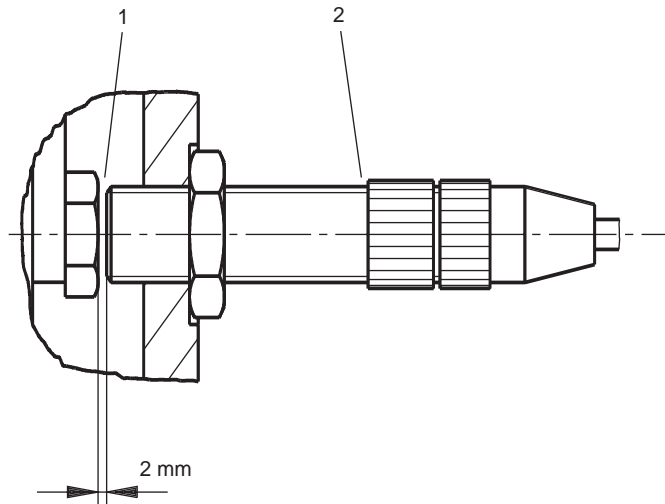


Figure 13: IG voltage pulse encoder

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## Connection/ adjustment of DA

The contact-free digital remote speed display DA is connected to the AC encoder GW or the IG voltage pulse encoder (Figure 14 and Figure 15):

1. Connect the device (Figure 14)
2. Ensure perfect ground connection at terminal 1
3. Adjust measuring interval (Figure 15 and Section "DA calculation examples" on page 22)
  - calculation using a formula
  - data in accordance with Table 3 on page 21
4. Adjust input sensitivity (Figure 15):
  - turn "input sensitivity" potentiometer clockwise until pulse indicator light starts to glow

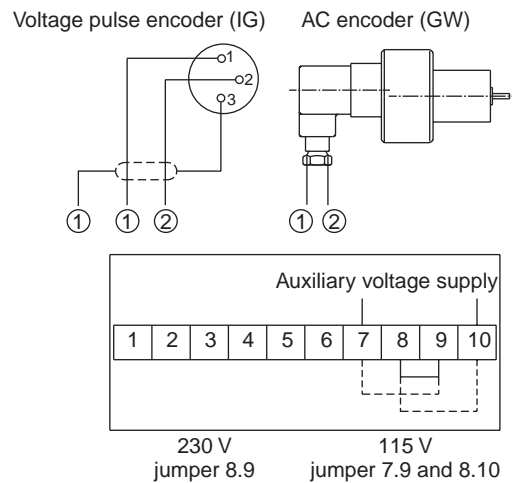


Figure 14: Connecting the DA digital remote speed display

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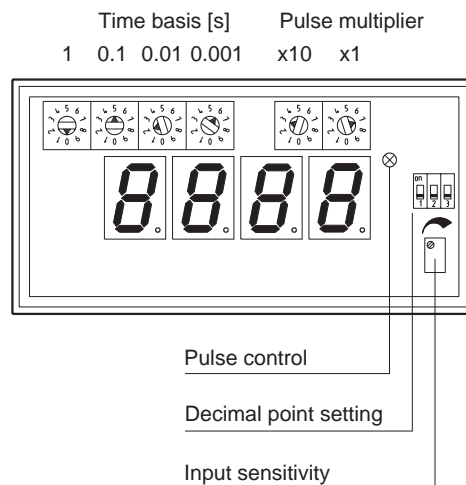


Figure 15: Adjusting the DA digital remote speed display

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## Technical data

- Digital display unit
- Supply voltage 230 V, 50-60 Hz
- Power consumption approx. 4.2 VA
- Encoder connection with two-core cable, shielded


**Connection/  
adjustment of FL  
(Figure 16)**

The contact-free analog remote speed display FL is connected to the voltage pulse encoder IG at the VARIBLOC®.

1. Connect the device
2. Operate drive at maximum speed
3. Adjust the unit via setting screws "Coarse" or "Fine" (at the back of the display unit) to a reading of 100 %
4. Ensure perfect ground connection at terminal M

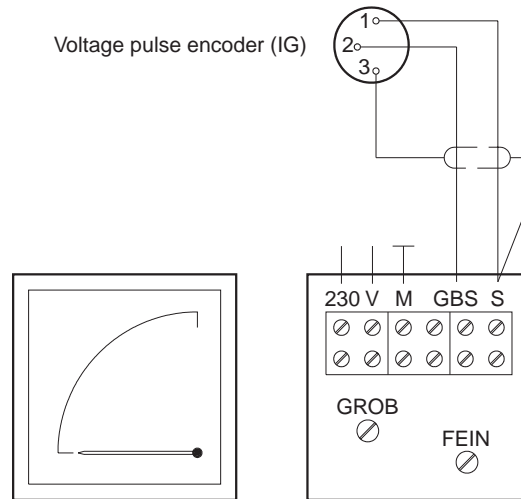


Figure 16: Connecting and adjusting contact-free FL remote speed display

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**Technical data**

- Analog display unit (scale from 0 % to 100 %)
- Supply voltage 230 V, 40-60 Hz
- Encoder connection with two-core shielded cable



**Adjustment data  
of digital remote  
speed display DA**

- Accuracy of indication: + / -1 of last digit
- Measuring interval (quartz): adjustment in increments of 0.001 s in the range of 0.010 s to 9.999 s after removing the face plate, recommended measuring interval: 0.5 to 2 s
- Pulse multiplier: adjustment in the range from 1 to 99 after removing the face plate
- Decimal point setting: via DIP switch after removing the face plate
- Calculation of measuring interval:  $measuringinterval = \frac{60}{n \cdot k}$

A = 4-digit display (at maximum speed), without decimal indication

n = speed (Table 3 on page 21)

k = pulse multiplier  $\geq 1$

z = pulses / revolution (Table 3 on page 21)

f = calculation factor (at 50 Hz = 1, at 60 Hz = 1.2)

Type / size of VARIBLOC®	Pulses / revolution	VARIBLOC® reference speed [rpm/min <sup>-1</sup> ]					
		R = 1:6 / 6:1			R = 1:8 / 8:1		
		4-pole	6-pole	8-pole	4-pole	6-pole	8-pole
VU/ VZ 01	4	3100	2045	1550			
VU/ VZ 11		3250	2160	1615	3905	2530	1870
VU/ VZ 21		3100	2050	1530	4004	2631	1916
VU/ VZ 31		3100	2050	1540	4090	2688	2002
VU/ VZ 41		3053	2035	1505			
VU/ VZ 51		3106	2056	1526			
		R = 1:4 (1:3) / 4:1 (3:1)					
VU 6 (D 200)	6	2528	1668	1247			
VU 6 (D 225)		2087					

Table 3: DA reference data

**DA calculation examples**

	Example 1	Example 2
<b>Drive</b>	R107R77VU21DADV100L4	R107R77VU21DADV100L4
<b>Data</b>	Output speed $n_a = 1.0 - 6.3$ Pulse rate $z = 4$ max. speed of variable speed gear $n = 3100 \text{ min}^{-1}$ (Table 3 on page 21)	Output speed $n_a = 1.0 - 6.3$ Pulse rate $z = 4$ max. speed of variable speed gear $n = 3100 \text{ min}^{-1}$ (Table 3 on page 21)
<b>Desired indication</b>	Output speed $A = 1000 - 6.300 \text{ min}^{-1}$	Strip speed $A = 0.114 \cdot 0.72 \text{ m/min}$
$\frac{60 \cdot A}{n \cdot k \cdot z \cdot f}$	$\frac{60 \cdot 6300}{3100 \cdot 1 \cdot 4 \cdot 1} = 30,48s$	$\frac{60 \cdot 0720}{3100 \cdot 1 \cdot 4 \cdot 1} = 3,484s$
<b>Recomm. measuring interval</b>	0.5 - 2 s (max. 9.999 s)	
<b>Calculation with new pulse multiplier</b>	$k = 25$ $Measuringinterval = \frac{60 \cdot 6300}{3100 \cdot 25 \cdot 4 \cdot 1} = 1,219s$	$k = 4$ $Measuringinterval = \frac{60 \cdot 0720}{3100 \cdot 4 \cdot 4 \cdot 1} = 0,871s$
<b>Device setup</b>	Measuring interval: [1] [2] [1] [9] Pulse multiplier: [2] [5] Decimal point setting: 1	Measuring interval: [0] [8] [7] [1] Pulse multiplier: [0] [4] Decimal point setting: 1



## 7 Inspection / Maintenance

### 7.1 Inspection and maintenance intervals

Unit / unit part	Interval	What to do?	-> Further details on page ...
VARIBLOC®	Weekly	Pass through speed range	
VARIBLOC®	Every <b>3000</b> hours of operation At least <b>every six months</b>	Inspect wide V-belt	"Inspect wide V-belt" on page 23
EF, EFP, EFPA	Every <b>20 000</b> adjustments At least <b>every six months</b>	Check adjusting spindle <ul style="list-style-type: none"> <li>• replace, if necessary</li> <li>• otherwise lubricate</li> </ul>	see "Lubricate EF/ EFPA adjusting spindle" on page 28

### 7.2 Before you begin

<b>Required tools</b>	<ul style="list-style-type: none"> <li>• Wrench set</li> <li>• Hammer</li> <li>• Mandrel or drift punch</li> <li>• Pliers for snap ring</li> <li>• Lubricant "Never Seeze normal"</li> </ul>
-----------------------	--

### 7.3 Inspection / maintenance of VARIBLOC®

**Inspect wide V-belt** If you answer one or more of the following questions with "Yes," the wide V-belt must be replaced (7.4).

Type of check	Tests to be performed for	
	VU 01-51/ VZ 01-41	VU 6
<b>Functional test</b>	<ul style="list-style-type: none"> <li>• Is a loud noise noticeable?</li> <li>• Do speed fluctuations occur?</li> </ul>	
<b>Visual inspection</b>	Remove ventilation plates: <ul style="list-style-type: none"> <li>• Is a lot of abrasive dust noticeable at the ventilation plates or in the housing?</li> <li>• Are the sides of the belt frayed?</li> <li>• Is the wide V-belt between the fins cracking or already torn?</li> </ul>	<ul style="list-style-type: none"> <li>• Is a lot of abrasive dust noticeable at the ventilation openings?</li> </ul>



## 7.4 Replacing wide V-belt



### Caution:

Use only original parts in accordance with the valid spare parts list!

**Replacing wide V-belt for VU 01-51 and VZ 01-41 (Figure 17)**



1. Adjust and set geared motor to highest speed.
2. **De-energize the drive and secure it against unintentional re-start! Block output side.**
3. Remove both lateral ventilation plates (1).
4. Remove bearing cover (2) and adjustment unit (3).
5. Loosen housing screws, separate control box halves A and B.
6. Secure driven spring-opposed adjustment disc GV with wood wedge (8).



### Caution:

**Disc halves should not be allowed to snap together through spring load!**

7. Remove:
  - adjustment sleeve (4) (for front adjustment), snap ring (5), driving adjustment disc halves  $TV_a$ .
8. Remove old wide V-Belt (7) and install new wide V-Belt.
9. Install:
  - driving adjustment disc half  $TV_a$ , ball bearing (6), snap ring (5), adjustment sleeve (4)
10. Remove wood wedge.
11. Bolt control box halves A and B together.
12. Install adjustment unit and bearing cover.
13. Attach ventilation plates.
14. Tighten wide V-belt.
  - turn positioning spindle clockwise using adjustment unit (3) until resistance is noticeable.
15. Check torsional play at output shaft.
  - correct: minor torsional play is noticeable
16. Remove block from output side (see point 2).
17. Switch on geared motor.
18. Slowly pass through the speed range.
  - correct: drive runs smoothly and evenly.



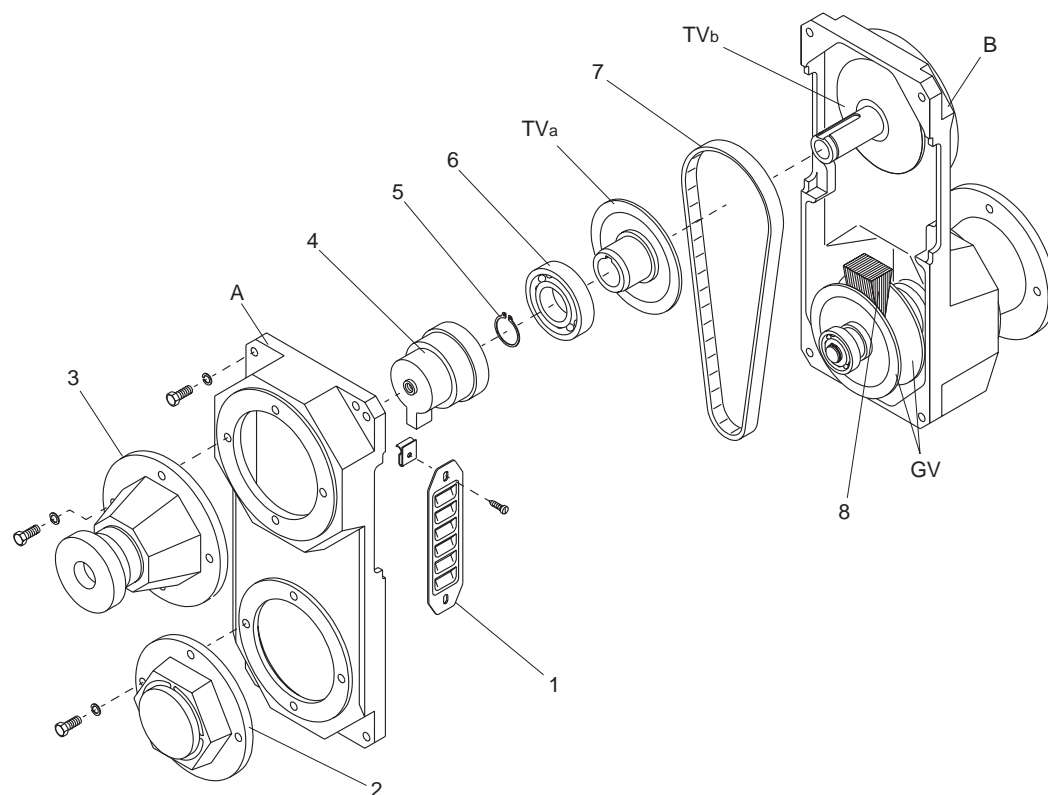


Figure 17: Replacing wide V-belt for VU 01-51 and VZ 01-41

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- 1 Ventilation plate
- 2 Bearing cover
- 3 Adjustment unit
- 4 Adjustment sleeve
- 5 Snap ring
- 6 Ball bearing
- 7 Wide V-belt
- 8 Wood wedge
- TV Driving adjustment disc
- GV Driven adjustment disc



**Replacing wide V-belt for VU 6  
(Figure 18)**



1. Adjust and set geared motor to highest speed.
2. **De-energize the drive and secure it against unintentional re-start! Block output side.**
3. Fully open driving adjustment disc TV:
  - turn counterclockwise via adjustment unit (3) until it stops.
4. **a) for front adjustment design:**
  - remove plate cover (1), snap ring (2) and support disc (3).
  - turn adjustment unit (4) clockwise to maximum setting.
  - loosen screws on cover (5), remove cover and detach adjustment unit.
- b) for all other designs:**
  - remove complete adjustment unit (4).
5. Loosen housing screws, remove control box half A.
6. Secure driven, spring-loaded adjustment disc GV with wood wedge (10).



**Caution:**

**Disc halves should not be allowed to snap together through spring load!**

7. At driving adjustment disc (TV):
  - remove support disc (3) and snap ring (2).
  - remove ball bearing (8) and adjustment disc half TV<sub>a</sub>.
8. Remove old wide V-Belt (7) and install new wide V-Belt.
9. Install at driving adjustment disc:
  - adjustment disc half TV<sub>a</sub>, ball bearing (6), snap ring (5) and support disc (3).
10. Remove wood wedge (8).
11. Bolt control box halves A and B together.
12. Install adjustment unit (4) in reverse order of points 4a / 4b.
13. Tighten wide V-belt (7):
  - turn positioning spindle clockwise using adjustment unit (4) until resistance is noticeable.
14. Remove block from output side (see point 2).
15. Switch on geared motor.
16. Slowly pass through the speed range.
  - correct: drive runs smoothly and evenly.

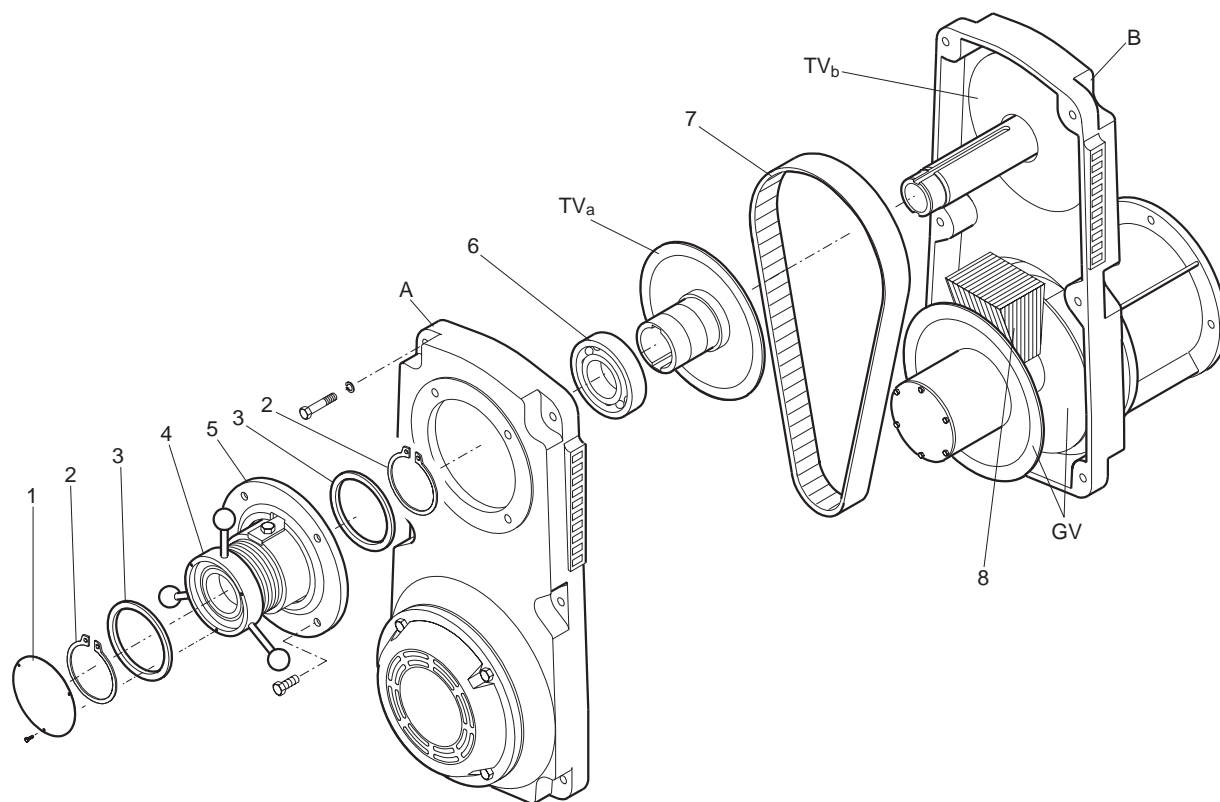


Figure 18: Replacing wide V-belt for VU 6

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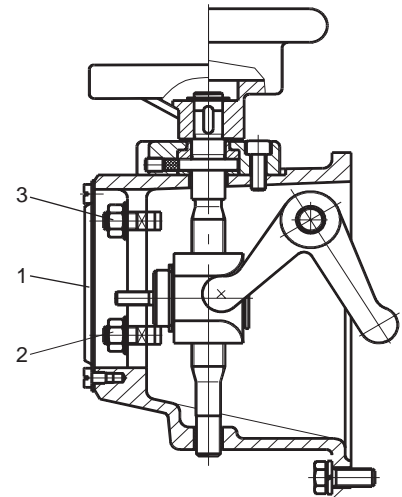
- 1 Plate cover
- 2 Snap ring
- 3 Support disc
- 4 Adjustment unit
- 5 Cover
- 6 Ball bearing
- 7 Wide V-belt
- 8 Wood wedge
- TV Driving adjustment disc
- GV Driven adjustment disc



### 7.5 Limiting the speed range for designs NV, H, HS

The limit speeds  $n_{\min}$  and  $n_{\max}$  are factory set. After wear of the belt or after installing a new wide V-belt, it may be necessary to define the speed range again.

1. Remove cover plate (1) at adjustment unit.
2. Set the desired maximum speed:
  - loosen hammer screw (2)
  - approach speed
  - lock hammer screw in this position
3. Set the desired minimum speed:
  - loosen hammer screw (3)
  - approach speed
  - lock hammer screw in this position.

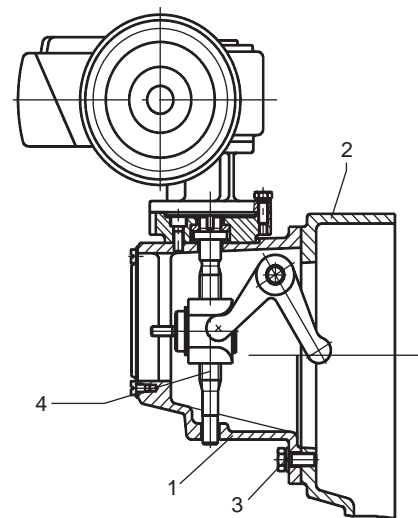


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Figure 19: Limiting the speed range for designs NV, H, HS

### 7.6 Lubricate EF/ EFPA adjusting spindle

1. Detach adjustment head (1) from control box (2).
  - loosen screws (3)
2. Lubricate adjusting spindle (4) with well-adhering lubricant, e. g. "Never Seeze normal."
3. Assemble in reverse order.



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Figure 20: Lubricating EF/ EFPA adjusting spindle



## 8 Operation and Service

Please provide the following information if you require assistance from customer service:

- Nameplate information
- State type and extent of the fault
- Time and circumstances of the fault
- Presumed cause

### 8.1 Malfunction of VARIBLOC® variable speed gear unit

Malfunction	Possible cause	Solution
Drive slips	Wide V-belt is worn	Replace wide V-belt (Section "Inspect wide V-belt" on page 23)
	Wide V-belt or face of adjustment disc is contaminated	Clean contaminated part: <ul style="list-style-type: none"> <li>• Wide V-belt – use dry cloth or paper</li> <li>• Adjustment disc – use solvent or similar product</li> </ul>
	Load is too high	Check measured power and reduce to catalog values
Drive warms up excessively	Load is too high	see above
Drive is too loud	Wide V-belt is damaged <b>Note:</b> Damage can occur <ul style="list-style-type: none"> <li>• after brief stalling of the drive</li> <li>• with intermittent loading of the drive</li> </ul>	1. Correct cause 2. Replace wide V-belt (Section 7.4)

### 8.2 Malfunction of optional equipment

**Electromechanical remote speed adjuster EF, EFPA**

Malfunction	Possible cause	Solution
Speed cannot be adjusted	Unit is not wired properly	Wire unit correctly in accordance with circuit diagram
Speed range cannot be reached	Limit switches of variable speed motor switch off too early	Adjust cams correctly for limit switch actuation (Section "Limiting the speed range for EF, EFPA" on page 14)
No display	<ul style="list-style-type: none"> <li>• Display unit is not properly connected</li> <li>• Voltage supply is missing or interrupted</li> </ul>	Connect display unit correctly in accordance with circuit diagram
Incorrect display	Display is not properly adjusted	Adjust display on back of unit (Section "Connecting / adjusting display unit for EFPA" on page 13)



**Contact-free  
remote speed  
display FL and  
DA, voltage pulse  
encoder IG**

Malfunction	Possible cause	Solution
No display or no signal	Input sensitivity (clearance of pulse encoder / screw head) too high or too low	Correct input sensitivity: Increase or decrease clearance between IG voltage pulse encoder and screw head ( Section "Mounting the voltage pulse encoder IG (Figure 13)" on page 18)
	<ul style="list-style-type: none"> <li>Unit is not properly connected</li> <li>Voltage supply is missing or interrupted</li> </ul>	Connect unit correctly in accordance with circuit diagram

**Hydraulic  
variable speed  
unit HY**

Malfunction	Possible cause	Solution
Small loss of oil	Not enough oil	Add oil (screw on positioning cylinder)



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