

**Centrifuges and other high inertia  
machines on VLT® 5000 frequency converters**

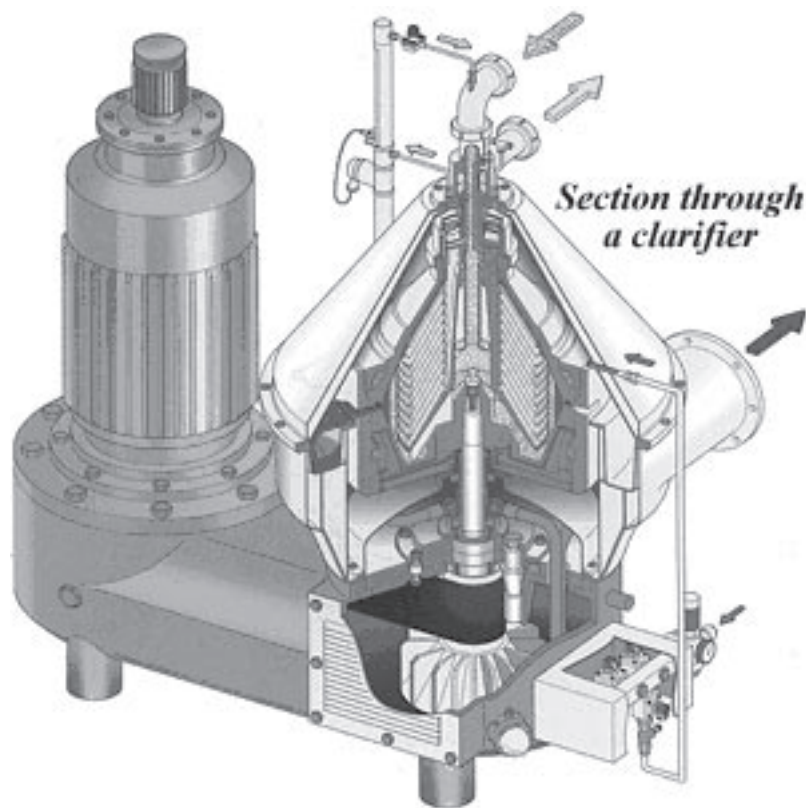


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**Separator**

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## Centrifuges and other high inertia machines on VLT® 5000 frequency converters

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### ■ General

By use of VLT 5000 on centrifuges, separators, decanters and other high inertia machines, VLT default settings cannot be used.

Special care has to be taken because the load has very high inertia. The following things have to be considered:

1. Setting of minimum speed
2. Setting of ramps
3. Setting of slip compensation
4. Setting of torque limit
5. Limiting of maximum speed
6. Stopping
7. The behaviour by power sags

### ■ Setting of minimum speed

Use parameter 204 to limit minimum speed. Never use parameter 201 (output frequency low limit). By accelerating up to the minimum frequency the ramp will only be stopped if the VLT touch alarm 12 or 13. By accelerating up to minimum speed the output frequency will be reduced if the VLT touch alarm 12 or 13. This will allow the VLT 5000 to absorb backlash in the machine.

### ■ Setting of ramps

To get a soft and sensitive start, and in order to prevent overshoot in speed, set the parameter 206 at S2.

### ■ Setting of slip compensation

To prevent speed hunting set parameter 115 at 0%. If the application demands the use of slip compensation, set parameter 115 at 100% and parameter 116 at 5s. The slip comp is a positive feedback. Combined with high inertia the "slip comp" has to be slow to prevent hunting and instability.

### ■ Setting of torque limit

Especially in applications with separators, shock load can occur. The VLT 5000 will then run in torque limit. In VLT > 5062 parameter 221 has to be set at 130%. This has to be done to prevent the VLT to trip on alarm 13.

In some separators, backlash in the gearbox can make noise. At high torque one can imagine that the shafts get twisted by the torque. If the VLT is brought into current limit it will limit the torque and some of the torsion forces are released. That can make noise. Using torque control can reduce the problem.

### ■ Limiting of maximum speed

The maximum speed reference is set in parameter 205, and parameter 202 has to be adjusted 10% higher in order to limit the maximum output speed. This leaves room for the overvoltage control to work. See also Stopping.

### ■ Stopping

An easy way to do it, is the use of "coasting". If the application does not allow the use of "coasting", but demands a ramp stop function, set the "ramp down" time, when there are no brake resistor connected, so high that the DC-bus voltage is stable under deceleration. Remember to set parameter 400 at overvoltage control and parameter 220 between 2-5%.

Some applications may get unstable at low speed, especially in high horse power applications. The function at stop feature can solve this problem. Set parameter 123 at a frequency higher than the unstable speed.

Please note that the braking time for VLT > 5062 must not be longer than 30 sec. (version 3.14x).

### ■ The behaviour by power sags

A restart of the VLT 5000 before the load is brought to stand-still can be very stressing for the drive. Using flying start (par 445) can prevent this stress. Remember to set parameter 407 (Mains failure) on Coasting.

If Kinetic back up or Controlled ramp down is demanded, the load of the VLT must be less than 50 to 75% of nominal load. 50% is typical for VLT > 5062 (status software version 3.14x).

### ■ Beltdriven centrifuges

The belt in a beltdriven centrifuge isolates the rotor in the motor from the machine ground. That can cause voltage pitting damages in the bearings. This problem can be eliminated by using 60° AVM modulation in parameter 446.

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### ■ Example of settings for a VLT 5052

No.	Name	Centrifuges	Standard	Standard	Standard
115	Slip compensat.	0%			
116	Slip time const.	5,00 s			
123	Min. f. func. stop	10,0 Hz			
202	Out freq hi lim	55,0 Hz			
204	Min. reference	40,000			
205	Max. reference	51,000			
206	Ramp type	S2			
207	Ramp up time 1	600,00 s			
208	Ramp down time 1	600,00 s			
222	Torque limit gener	5,0%			
400	Brake function	Overvoltage control	Overvoltage control	Overvoltage control	Overvoltage control
407	Mains failure	Coasting			
445	Flying start	Enable			
446	Switch pattern	60° avm			
450	Mains fail volt.	342 V			

### ■ Example of settings for VLT 5100

No.	Name	Setup 1	Setup 2	Setup 3	Setup 4
115	Slip compensat.	0%			
116	Slip time const.	5,00 s			
123	Min.f.func.stop	10,0 Hz			
202	Out freq hi lim	55,0 Hz			
204	Min. reference	40,000			
205	Max. reference	51,000			
206	Ramp type	S2			
207	Ramp up time 1	600,00 s			
208	Ramp down time 1	600,00 s			
221	Torque limit motor	130,0%			
222	Torque limit gener	5,0%			
400	Brake function	Overvoltage control	Overvoltage control	Overvoltage control	Overvoltage control
445	Flying start	Enable			
446	Switch pattern	60° avm			
450	Mains fail volt.	342 V			

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Wiring diagram - Centrifuges

Drive type: 5100

