TOS-PG-S11
Optionboard
for TOSHIBA Frequency Inverters Series VF-S11

PID controlled slip compensation
with Pulse Encoder feedback

ESCO
EUGEN SCHMIDT UND CO
ANTRIEBSTECHNIK
Pulsegate
for TOSHIBA Frequency Inverters series VF-S11

Description
An encoder and the pulse gate feedback option allow to drive an induction motor without slip. With the feedback from the encoder the internal PID controller of the VF-S11 adjusts the drive speed so that the shaft rotation speed is (independent from load fluctuations) exactly \( R = f \times \frac{60}{P} \).

Example: 50Hz frequency command produces exactly 1500 rpm shaft rotation speed constantly with a standard 2-Pole induction motor.

Mounting
Fit the option board into the terminals PP and CC of the TOSHIBA Frequency Inverter VF-S11. Connect the red cable with terminal P24 and the green cable with the terminal VIB (or VIA).

Connect a HTL- or Open-Collektor Pulse Encoder (suitable for 24V DC power supply) to the terminal CC (common ground) and P24 (24V DC) of the option board. Connect the output of one trace of the encoder with the terminal Imp of the option board.

Adjustment
After mounting the encoder and the option board, speed up the drive to the highest speed needed for the application (eg. without load). Make sure that the shaft rotation speed is exactly as desired (eg. with an optical measurement device).

Example: 55Hz inverter frequency command may result in exactly 1500 rpm without feedback.

Now measure the analog DC voltage at the green cable (terminal VIB or VIA) and adjust it to exactly 10V DC with the trimmer potentiometer on the option board (see image above).

Parameters
Please read also chapter 6.15 (page F-45) in the english VF-S11 manual E6581158.

Control the settings for the VIA (VIB)-terminal in parameter F2 10 - F2 13 (F201 to F204). Set Parameter F2 13 (F204) to the nominal stator (no-slip-) frequency for your application.

Example: 1500 rpm synchronous speed with a 2-pole motor needs 50Hz stator frequency.

Activate the PID-control of the Frequency Inverter with parameter F360. Adjust the P- I- und D- gains with the parameters F362, F363 and F366.
PID control properties

- Fast response ($F \Delta e = \text{Large gain}$)
- Slow response ($F \Delta e = \text{Small gain}$)
- Residual deviation
- Process quantity setting value

- Process quantity setting value
- Feedback amount

- Large differential gain
- Small differential gain
- Time
PulseGate
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Graph for input terminal VIA:

<table>
<thead>
<tr>
<th>Type</th>
<th>demodulator for speed pulses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Temperature</td>
<td>-10°C...+50°C</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>-25°C...+65°C</td>
</tr>
<tr>
<td>Rel. Humidity</td>
<td>20...90% (no condensation)</td>
</tr>
<tr>
<td>Vibration</td>
<td>maximal 5.9 m / s²</td>
</tr>
<tr>
<td>Cooling</td>
<td>self cooling</td>
</tr>
<tr>
<td>Voltage Supply</td>
<td>internal 24 V DC from frequency inverter</td>
</tr>
<tr>
<td>Output Voltage</td>
<td>0…10V DC</td>
</tr>
<tr>
<td>Encoder Types</td>
<td>TTL / HTL or Open-Collector (suitable for 24V DC supply voltage) max. 1kHz / 11kHz</td>
</tr>
<tr>
<td>Dimensions</td>
<td>(51,5 x 13 x 31) mm (B x H x T)</td>
</tr>
</tbody>
</table>

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