Description

Many frequency converters are provided with only one unipolar analog input (0 through 10 V) for the setpoint voltage. The direction of rotation of the connected motor is defined by two digital inputs at the frequency converter.

By default, the D-SV servo controller submodule of the DELTA controller family works with a bipolar analog output ±10 V. However, this output can be reconfigured to unipolar analog output with two digital direction outputs.

This application note describes the procedure for configuring the unipolar DAC output (DAC = digital-analog-converter).

Configuration

To control the direction of rotation of the motor connected to a frequency converter with unipolar analog input, two digital outputs of the output submodule D-O16 on the controller board (D-CON, D-CON+, ...) are used, i.e. one output for positive direction of rotation and the other output for negative direction of rotation. The D-O16 must be located on the same controller board as the D-SV.

Configuring digital outputs

The registers on the controller board are written as follows:

- x: slot number of the controller card, y: axis number

<table>
<thead>
<tr>
<th>Register</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>REGISTER_LOAD [1xy118 with z1]</td>
<td>Ramp in positive direction</td>
</tr>
<tr>
<td>REGISTER_LOAD [1xy119 with z2]</td>
<td>Ramp in negative direction</td>
</tr>
<tr>
<td>REGISTER_LOAD [1xy120 with 0]</td>
<td>AXARR</td>
</tr>
<tr>
<td>REGISTER_LOAD [1xy121 with z1]</td>
<td>Max. velocity in positive direction</td>
</tr>
<tr>
<td>REGISTER_LOAD [1xy122 with z2]</td>
<td>Max. velocity in negative direction</td>
</tr>
</tbody>
</table>

The registers mentioned above are special registers used in the positioning via outputs mode.

Here a description of the operating principle of this mode:

If the respective axis is moving in positive direction (ramp or moving at top velocity), then value z1 is written to the register of the overlaid outputs of the D-O16 on this controller board.

Accordingly, value z2 is written to the register of the overlaid outputs of the D-O16 if the respective axis is moving in negative direction (ramp or moving at top velocity).

The AXARR condition is not mapped to outputs (REGISTER_LOAD [1xy120 with 0]) since the AXARR bit continues to be active and can be queried.

Values z1 and z2 specify which outputs of the D-O16 are set.
Registers 1xy118 ... 1xy122 are bit-coded:

<table>
<thead>
<tr>
<th>Register bit</th>
<th>15</th>
<th>14</th>
<th>...</th>
<th>8</th>
<th>7</th>
<th>6</th>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of output</td>
<td>a16</td>
<td>a15</td>
<td>a...</td>
<td>a09</td>
<td>a08</td>
<td>a07</td>
<td>a06</td>
<td>a05</td>
<td>a04</td>
<td>a03</td>
<td>a02</td>
<td>a01</td>
</tr>
</tbody>
</table>

Exemplary value $z_1 = 1$ (binary)  
0 0 ... 0 0 0 0 0 0 0 0 1

Exemplary value $z_2 = 2$ (binary)  
0 0 ... 0 0 0 0 0 0 0 1 0

**Access authority for the setting of digital outputs**

Registers 1xy124 and 1xy126 must be written additionally.

The bit-coded register 1xy124 can be used to give the controller board the authority to access certain outputs of the D-O16.

REGISTER_LOAD [1xy124 with 3]

The register bits are assigned to the outputs of the D-O16 according to registers 1xy118 ... 1xy122 so that value 3 indicates that the controller board has the access authority for outputs a01 and a02.

As reaction to this, the access authority for outputs a01 and a02 must be withdrawn from the DELTA CPU board to avoid unintentional modifications. For this purpose, the bits corresponding to the outputs must be reset.

REGISTER_LOAD [1xy126 with 65532]

<table>
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<tr>
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<th>7</th>
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<td>a05</td>
<td>a04</td>
<td>a03</td>
<td>a02</td>
<td>a01</td>
</tr>
</tbody>
</table>

Exemplary value for register 1xy124  
0 0 ... 0 0 0 0 0 0 0 1 1

Exemplary value for register 1xy126  
1 1 ... 1 1 1 1 1 1 0 0
Example

If the registers are written as follows,

REGISTER_LOAD [1xy118 with 1]
REGISTER_LOAD [1xy119 with 2]
REGISTER_LOAD [1xy120 with 0]
REGISTER_LOAD [1xy121 with 1]
REGISTER_LOAD [1xy122 with 2]
REGISTER_LOAD [1xy124 with 3]
REGISTER_LOAD [1xy126 with 65532]

then output a01 is active when the axis moves in positive direction, and output a02 is active when the axis moves in negative direction.

Starting unipolar DAC output

When all registers have been configured accordingly, unipolar DAC output is started by issuing command 70. At the same time, positioning via outputs must be started by issuing command 86:

REGISTER_LOAD [1xy001 with 70]
REGISTER_LOAD [1xy001 with 86]

Stopping unipolar DAC output

Unipolar DAC output is stopped by issuing command 71, and positioning via outputs is stopped by issuing command 87:

REGISTER_LOAD [1xy001 with 71]
REGISTER_LOAD [1xy001 with 87]