Rotational Direction

Triamec Convention

This document describes the convention regarding rotational directions used for the *Triamec* Drives. This convention is in accordance with the standards of IEC 60034-8 and DIN EN60034-8. With motors and encoders connected according this convention, a predicable direction of rotation is ensured.

Table of Contents

www.triamec.com

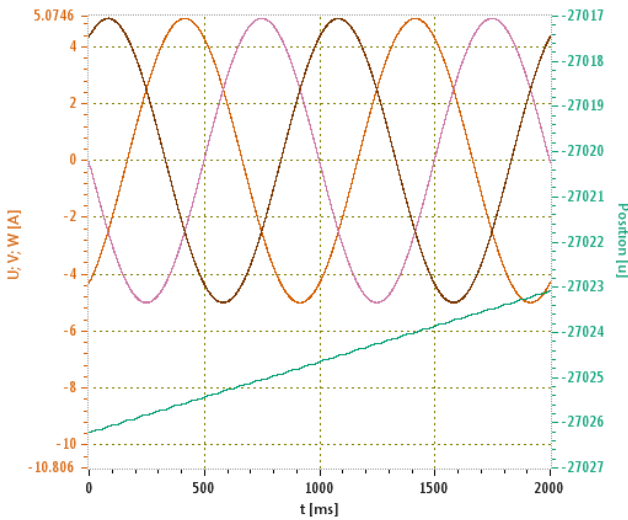# 1 Direction of Rotation According IEC 60034-8

According to IEC 60034-8, a motor is rotating in positive direction if it rotates in clockwise direction while looking at the shaft-side of the motor.

Figure 1: Positive rotational direction

If a three-phase alternating current is applied to a synchronous motor which fulfills IEC 60034-8, the motor rotates in positive direction if
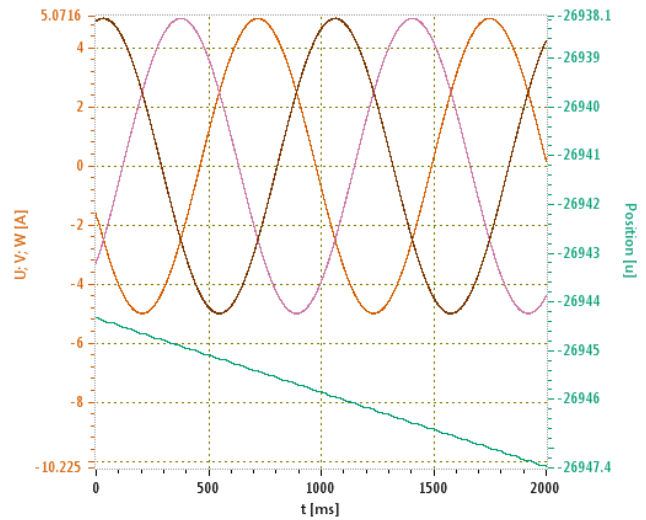
- phase U leads phase V by 120° and phase V leads phase W by 120°.

Figure 2: According to IEC 60034-8 phase-current order of U-V-W causes rotation in positive direction.

Figure 3: According to IEC 60034-8 phase-current order of W-V-U causes rotation in negative direction.

2 Interpretation of Rotational Direction by Triamec Drives

This section describes how the rotational direction is handled by the *Triamec* drives by default. The rotational direction can be adjusted by the parameters

- PositionController.Encoders[].InvertDirection and
- Motor.InvertDirection.

2.1 Phase-Current Rotation

If the current-vector is rotated in positive direction (commutation angle has a positive velocity) and the parameter Motor.InvertDirection and Encoders[].InvertDirection are set to false (default), the phase current at the connector will have the order U-V-W by as shown in Figure 2. Therefore, a motor which fulfills IEC 60034-8 will rotate in positive direction in this case.

2.2 Encoder Rotation

For encoders, there exists no standard regarding the rotational direction and the positive direction depends on the implementation by the manufacturer. If Encoders[].InvertDirection is set to false, the *Triamec* drive interprets the encoder signals as follows:

Analog Encoder and Incremental Encoder

To determine the rotational direction, the phase shift of 90° between the phase A and phase B is used:

- Positive direction: Phase A leads phase B by 90°
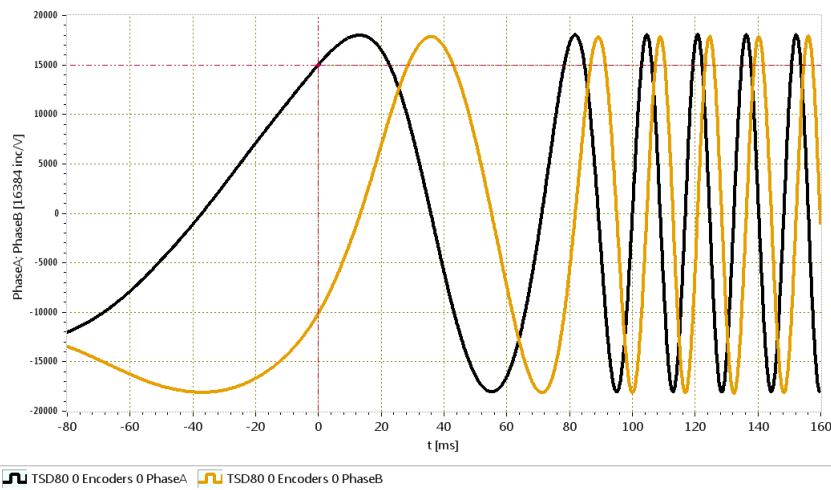- Negative direction: Phase A lags phase B by 90°

Printed on 2/17/2016 9:54:37 AM

Figure 4: Phase A leads phase B by 90° -> encoder counts in positive direction.

Digital Encoders with Serial Protocol

As the position transfer is based on a serial protocol, the rotational direction is defined by the manufacturer of the encoder.

2.3 Encoder Inversion

In case the desired positive direction of the axis is opposite to the encoder count, the parameter

PositionController.Encoders[].InvertDirection

can be set to true so the positive direction does match with the direction of the actual position of the drive. This parameter also affects the direction of the commutation of the motor (see next section).

2.4 Motor Inversion

The direction of the commutation angle and the direction of the encoder count have to be aligned. If this is not the case, the parameter

Parameters.Motor.InvertDirection

has to be set to TRUE.

Motor direction U-V-W	Encoder count direction	InvertDirection
CW	CW	FALSE
CW	CCW	TRUE
CCW	CW	TRUE
CCW	CCW	FALSE

3 Digital Encoders: Alignment Between Motor and Encoder

Some digital encoders are aligned with the motor at the factory. For example, this is done by setting the encoder count to zero while a current is applied between two phases (e.g. Kollmorgen: positive DC current into phase W and out of phase V (U floats)).

Figure 5: Kollmorgen AKM encoder alignment.

If the motor is aligned with the encoder, the encoder count can be used for the commutation of the

motor and the motor can be enabled without an initial phasing. See [1] section "Commutation with Absolute Encoder" for more information.

References

[1] "Servo Drive Setup Guide", ServoDrive-SetupGuide_EP025.pdf, Triamec Motion AG, 2024

[2] "Encoder configuration for the TSD drive series", AN107_Encoder_EP023.pdf, Triamec Motion AG, 2023.

[3] "Kollmorgen AKMTM Servomotor Selection Guide", AKM-Selection_Guide-en-US_RevB.pdf, Kollmorgen Corporation.

Revision History

Version	Date	Editor	Comment
001	2019-02-07	dg	Initial edit
002	2024-03-14	ab, dg	Applied actual template, review and updated for release

Copyright © 2024
Triamec Motion AG
All rights reserved.

Triamec Motion AG
Lindenstrasse 16
6340 Baar / Switzerland

Phone   +41 41 747 4040
Email   info@triamec.com
Web   www.triamec.com

Disclaimer