

### A0009 Automatic baud rate detection for servos

I/O configuration: I/O\_X31/X32

Easy startup mode operated via ...

- Engineering Port (TCP/IP)
- Digital inputs
- Automatic I/O configuration

Drive enable: ---

Jog +: ---

Jog -: ---

Status

- Easy startup mode active
- Start Easy Startup Mode

Act. velocity value: 0.00 mm/min

Active actual pos. val.: 5.6676 mm

Jogging:  Cmd value input  Motor potentiometer

Active cmd value: 0.00 mm/min

Jog velocity: 13000.00 mm/min

Jog +: ---

Jog -: ---

- Limit Values
    - Motion Limit Values
    - Torque / Force Limits
  - Drive Control
    - Drive Control Overview
    - Axis Control
    - Motor Control
      - Motor Control Overview
      - Field Control
      - Current Limits
      - Open-Loop U/f Control
      - Sensorless Flux Control
      - Velocity Search Mode
      - Commutation Settings
    - Status Messages
  - Compensation Functions / Correct
    - Friction Torque Compensation
    - Backlash on Reversal Correct
  - Operation Modes / Drive Halt
    - Operation Modes
    - Drive Halt
  - Error Reaction
    - Error Reaction Drive
    - Error Reaction Power Section
    - E-Stop Function
    - Drive-integrated Safety Technology
      - Safe torque off
      - Probe
  - Optimization / Commissioning
    - Easy Startup Mode**
    - Command Value Box
    - Drive-integrated Command Value C
    - Motor Data Identification
    - Automatic Setting of Axis Control...
    - Frequency Response Analysis
    - Axis Simulation
- Local I/Os

- ▶ Mechanical Gear
- ▶ Limit Values
- ▶ Motion Limit Values
- ▶ Torque / Force Limits
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- ▶ Axis Simulation

Signal probe 1

S-0-0000: <no signal>

Continuous measurement

Positive edge

Negative edge

Dead time compensation, positive edge:  us

Dead time compensation, negative edge:  us

Activation with expectation window

Marker failure monitoring

Start position:  mm

End position:  mm

Time measurement

Quick stop when signal at probe input 1

Signal probe 2

S-0-0000: <no signal>

Continuous measurement

Positive edge

Negative edge

Dead time compensation, positive edge:  us

Dead time compensation, negative edge:  us

Activation with expectation window

Marker failure monitoring

Start position:  mm

End position:  mm

Time measurement

Probe evaluation

Activate evaluation

Disable evaluation

Autoactivation of probing cycle proc. command

[Probe Status](#)

[I/O X31/X32 \(Configuration of probe inputs\)](#)



Evaluation of the E-Stop signal

... inactive  
 ... active via digital input I/O X31/X32

E-Stop is interpreted as ...

... error message F4034. The error must be reset.  
 ... warning E8034. After deceleration, axis can be moved again.

Kind of reaction

Velocity command value reset  
 As set for 'best possible deceleration'

- Motor Encoder
  - Motor Encoder
  - Motor Encoder Extended
  - Data Reference Motor Encoder
- Optional Encoder
  - Position Switch Point
- Scaling / Mechanical System
  - Scaling / Units
  - Scaling / Units Extended
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  - Probe

Module group

Control word DC bus voltage OK

Status word DC bus voltage OK

Package reaction

- Reaction to error in module group
- Triggering of package reaction on error

DC bus undervoltage

DC bus undervoltage threshold 0 V

- Undervoltage as non-fatal error (F2026, F2819), "best possible deceleration"
- Undervoltage as non-fatal warning (E2026, E2819), no error reaction of the drive
- Undervoltage as fatal warning (E8026, E8819), motive element switched off

Drive clears error (F2026) automatically, when enable signal is removed

Power off on error

- Only when power supply errors occur
- When any errors occur

[Power Supply](#)

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Drive reaction to error and by switching drive enable off

- Immediately "Best possible deceleration"
- External NC reaction for 30 s, then best possible deceleration

Best possible deceleration

F2/F3/F4 error

F6/F7 error

F8 error  Motor phase short circuit, if possible

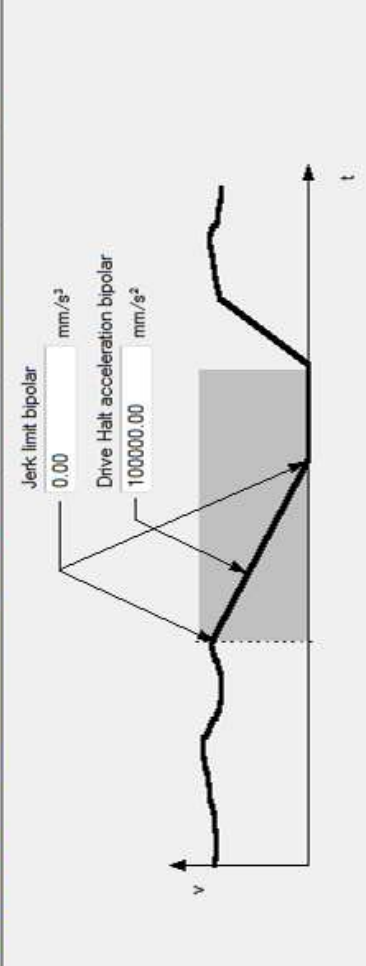
Max. deceleration time  ms

Acceleration bipolar  mm/s<sup>2</sup> Torque/force peak limit.  %

[Motion limit values](#)

[Torque / Force Limits](#)

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  - Command Value Box



Drive Halt configuration

Best possible deceleration in active operation mode:

Operational stop

Best possible deceleration in internal operation mode Drive Halt:

Quick stop (position-controlled)

Quick stop (velocity-controlled)

Quick stop (defined by operation modes)

[Status Messages](#)

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- Primary oper. mode Velocity control
- Second. oper. mode 1 Velocity control
- Second. oper. mode 2 Velocity control
- Second. oper. mode 3 Velocity control
- Second. oper. mode 4 Velocity control
- Second. oper. mode 5 Velocity control
- Second. oper. mode 6 Velocity control
- Second. oper. mode 7 Velocity control
- Internal secondary oper. mode



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Friction torque compensation

0.0 % | Friction value, positive | + | Friction value, negative |

2

with Standstill window 2000.00 mm/min

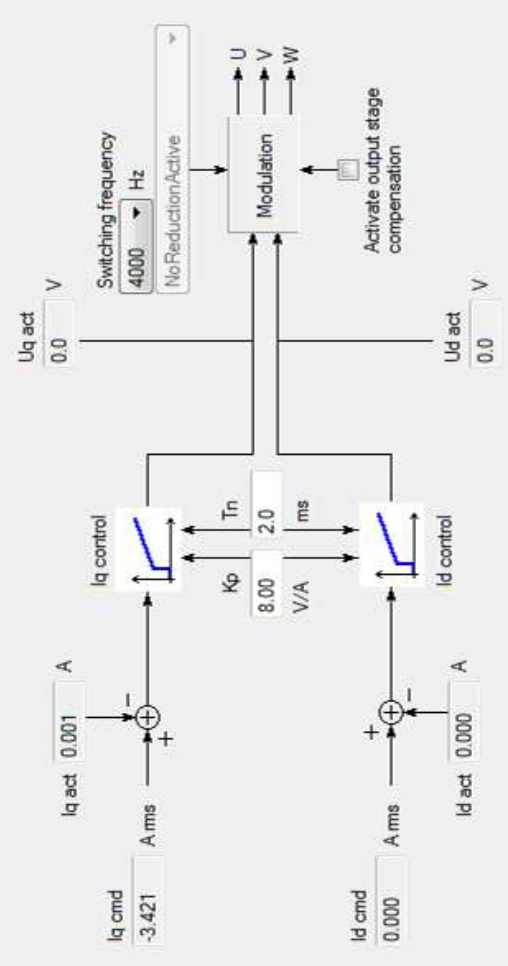


<p><input checked="" type="checkbox"/> Message: "In Position" lag error &lt; position window</p> <p>Position window: 0.1000 mm</p>	<p><input checked="" type="checkbox"/> Message: lag error &lt; coarse position window</p> <p>Coarse position window: 0.5000 mm</p>
<p><input checked="" type="checkbox"/> Message: "Standstill"  actual velocity  &lt; standstill window</p> <p>Standstill window: 2000.00 mm/min</p>	<p><input checked="" type="checkbox"/> Message:  actual velocity  &lt; threshold vx</p> <p>Velocity threshold vx: 100000.00 mm/min</p>
<p><input checked="" type="checkbox"/> Message: actual velocity = command velocity</p> <p>Velocity window: 10000.00 mm/min</p>	<p><input type="checkbox"/> Message:  actual torque/force value  &gt; threshold Mdx</p> <p>Torque threshold Max: 100.0 %</p>
<p><input type="checkbox"/> Message: command velocity &gt; limit value</p> <p><a href="#">Motion_Lmt.Values</a></p>	<p><input type="checkbox"/> Message:  actual power value  &gt;= threshold Px</p> <p>Power threshold Px: 0 Watt</p>
<p><input type="checkbox"/> Message: "Torque/force cmd value reached"  cmd force-act force  &lt; torque/force window</p> <p>Torque/force window: 0.0 %</p>	

- ▶ Motor Temperature Model
- ▶ Brake
- ▶ Brake Check
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- ▶ Drive-Integrated Command Value G



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[Motor\\_Control\\_Overview](#)

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**Motor temperature limitation**

Motor peak current: 12.000 A

Motor current at standstill: 2.187 A

Current motor temperature: 0.0 °C

**Amplifier temperature limitation**

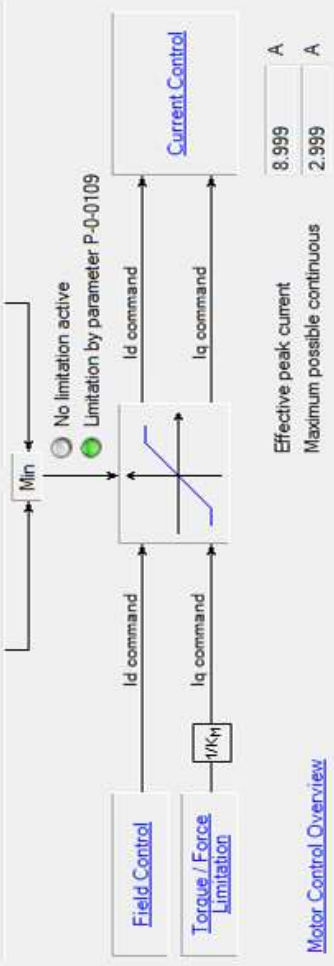
Amplifier peak current: 8.999 A

Amplifier nominal current: 3.000 A

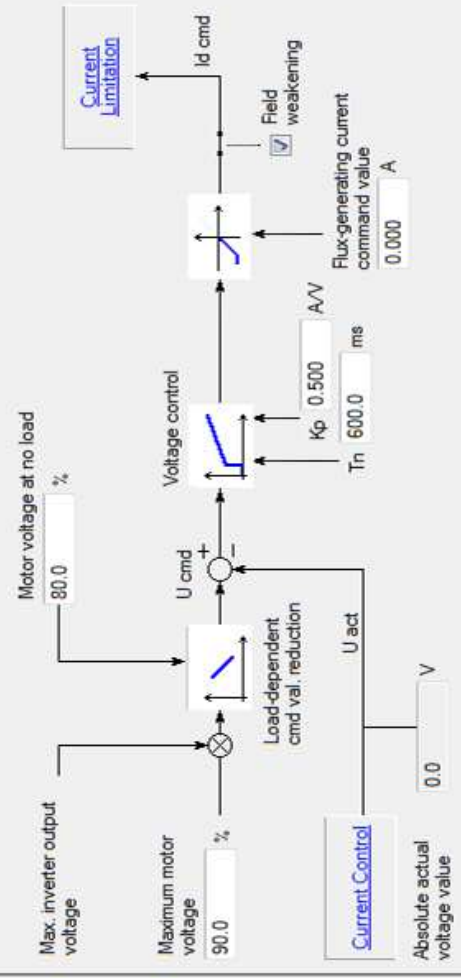
Amplifier temperature: 31.6 °C

Them. drive load: 0.1 %

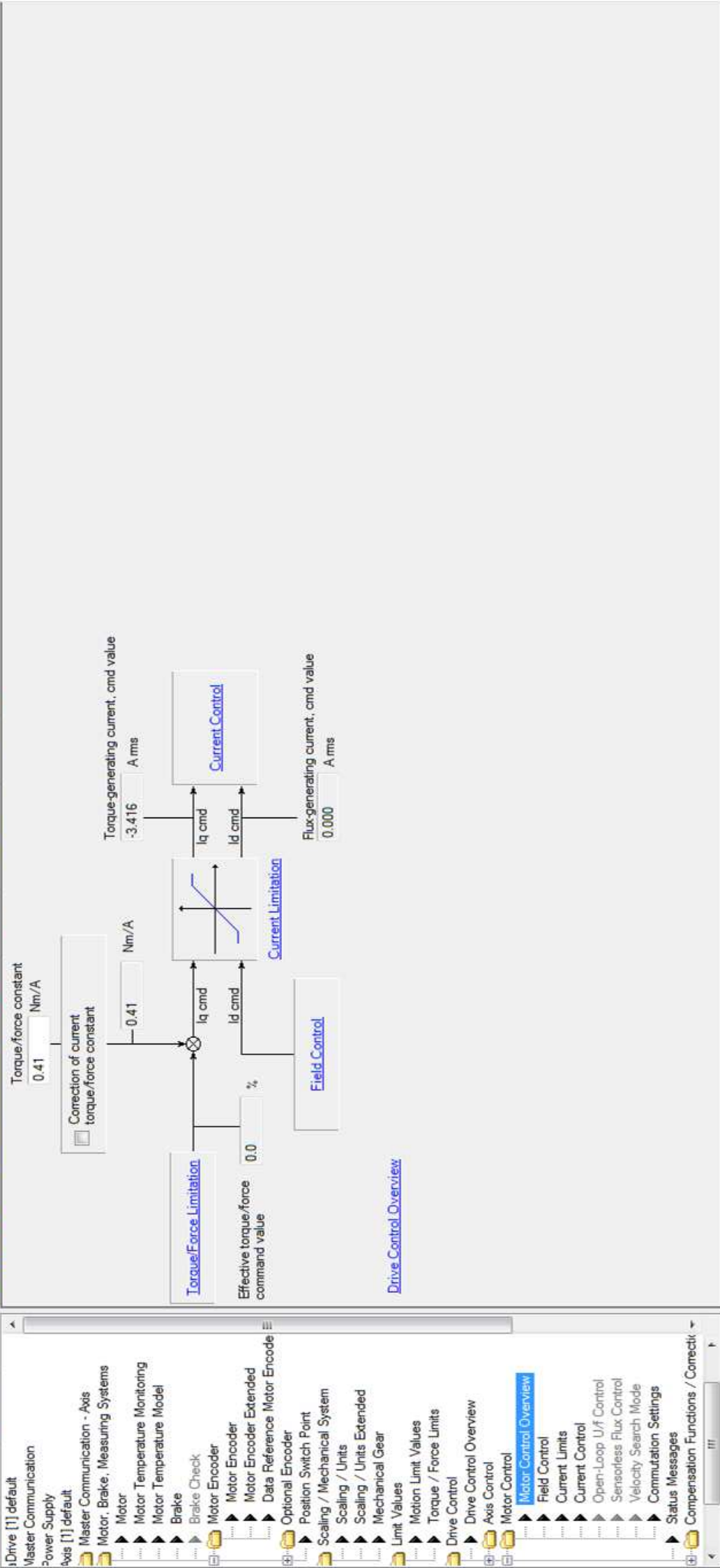
Warning threshold of amplifier load: 80 %



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Velocity control loop monitoring

Active  
 Not active

Position control loop monitoring

Max. model deviation  mm  
 Monitoring window  mm

Position monitoring feedback 1 - feedback 2

Monitoring window feedback 2  mm  
 Actual position value difference encoder 1 - encoder 2  mm

[Axis Control](#)

Speed controller smoothing time constant  
800 us

Velocity control loop: Filter 1  
Type: No filter  
Activate Filter Type

Velocity control loop: Filter 2  
Type: No filter  
Activate Filter Type

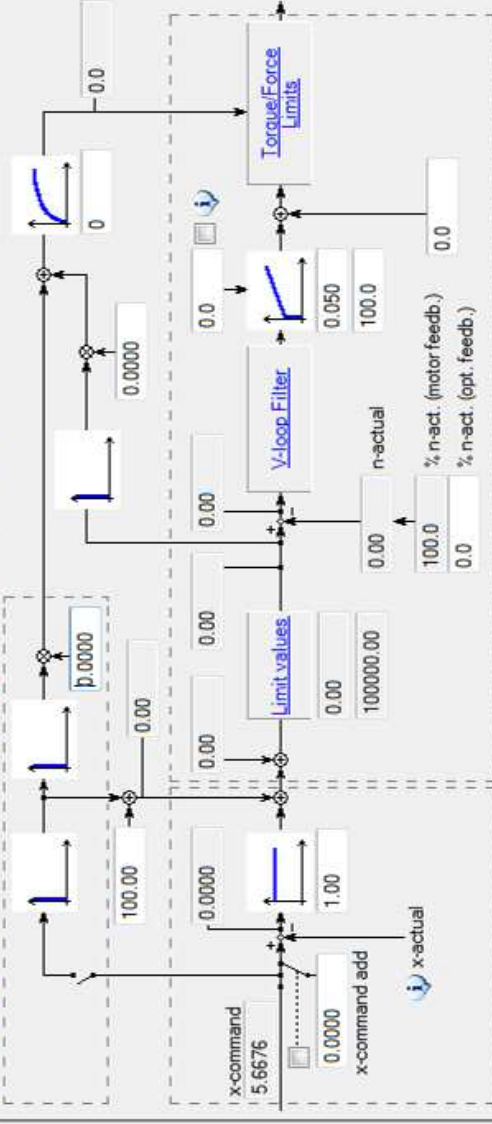
Velocity control loop: Filter 3  
Type: No filter  
Activate Filter Type

Velocity control loop: Filter 4  
Type: No filter  
Activate Filter Type

[Axis Control Settings](#)  
Suggestions for Filter Settings

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Control loop mode

- Advanced (X-loop: 250  $\mu$ s / V-loop: 125  $\mu$ s)
- Basic (X-loop: 500  $\mu$ s / V-loop: 250  $\mu$ s)

Selected parameter

Name	Acceleration feedforward gain
Range	0.0000 to 214748.3647 mNm/(rad/s <sup>2</sup> )

[Control Loop Monitoring](#)      [Drive Control Overview](#)

- Field-oriented current control with encoder
  - U/f control
  - Current control without encoder, rotor flux controlled
  - Flux-controlled (FXC) without encoder

Type of construction of motor

- Asynchronous
- Synchronous



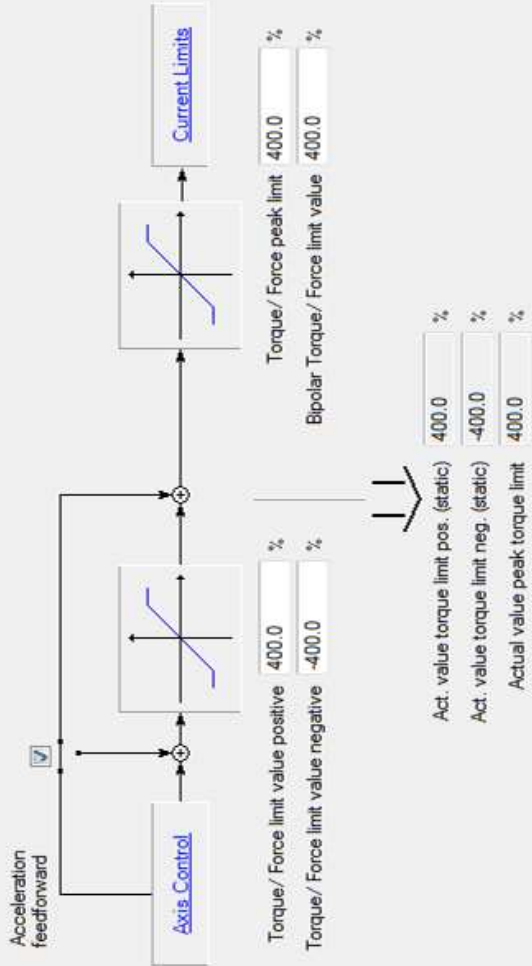
Load Default Controller Parameters

automatic loading of default controller parameters when clearing error in case motor was replaced

Automatic Setting of Axis Control...

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[Drive Control Overview](#)

**Position limit value monitoring**  
 Actual pos. val. (motor enc.) 5.6676 mm  
 Position limit value positive 0.0000 mm  
 Position limit value negative 0.0000 mm

**Velocity limit value**  
Limit value positive 0.01 mm/min  
Limit value negative 0.00 mm/min  
Bipolar limit value 100000.00 mm/min  
Maximum motor speed 8000.0000 rpm

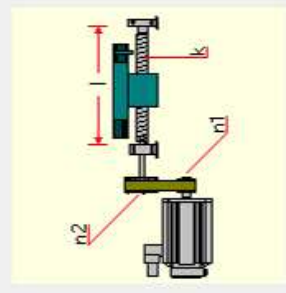
**Travel range limit switch monitoring**  
 Reaction when travel range exceeded  
Warning Error

Bipolar accel. limit value 0.00 mm/s<sup>2</sup>  
Bipolar jerk limit value 0.00 mm/s<sup>3</sup>  
Standstill window 2000.00 mm/min

[Torque/Force Limits](#)

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      - ▶ Torque / Force Limits
    - ▶ Drive Control
    - ▶ Operation Modes / Drive Halt
    - ▶ Error Reaction
    - ▶ Drive-Integrated Safety Technology
      - ▶ Probe
    - ▶ Optimization / Commissioning
      - ▶ Easy Startup Mode
      - ▶ Command Value Box
      - ▶ Drive-Integrated Command Value
      - ▶ Motor Data Identification
      - ▶ Automatic Setting of Axis Control...
      - ▶ Frequency Response Analysis
      - ▶ Axis Simulation
  - ▶ Local I/Os



Position data in

absolute format

modulo format

360.0000 mm

Mode

Shortest distance

Positive direction

Negative direction

Maximum travel range l  mm

Feed constant k  mm/Rev

Input revolutions of load gear n1

Output revolutions of load gear n2

Load inertia, with reference to motor  kgm<sup>2</sup>

Absolute encoder evaluation of motor enc. possible

[Settings of Motor Encoder](#)

Absolute encoder evaluation of optional enc. possible

[Settings of Optional Encoder](#)



- IndraDrive [1] default
  - ▶ Master Communication
  - ▶ Power Supply
  - ▶ Axis [1] default
    - ▶ Master Communication - Axis
      - ▶ Motor, Brake, Measuring Systems
        - ▶ Motor
        - ▶ Motor Temperature Monitoring
        - ▶ Motor Temperature Model
        - ▶ Brake
        - ▶ Brake Check
        - ▶ Motor Encoder
          - ▶ Motor Encoder
          - ▶ Motor Encoder Extended
          - ▶ Data Reference Motor Encod
          - ▶ Optional Encoder
          - ▶ Position Switch Point
        - ▶ Scaling / Mechanical System
          - ▶ **Scaling / Units**
          - ▶ Scaling / Units Extended
          - ▶ Mechanical Gear
        - ▶ Limit Values
          - ▶ Motion Limit Values
          - ▶ Torque / Force Limits
      - ▶ Drive Control
      - ▶ Operation Modes / Drive Halt
      - ▶ Error Reaction
        - ▶ Drive-Integrated Safety Technology
        - ▶ Probe
      - ▶ Optimization / Commissioning
        - ▶ Easy Startup Mode
        - ▶ Command Value Box
        - ▶ Drive-Integrated Command Value
        - ▶ Motor Data Identification
        - ▶ Automatic Setting of Axis Control...
        - ▶ Frequency Response Analysis
        - ▶ Axis Simulation

Scaling type

Rotary  
 Linear  
 Scaling not uniform

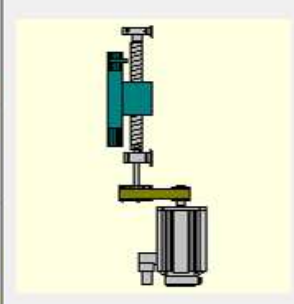
Position data format

Absolute  
 Modulo

360.00000 mm

Resolution ...

...of position data	0.0001 mm
...of velocity data	0.001 mm/min
...of acceleration data	0.001 mm/s <sup>2</sup>
...of torque/force data	0.1 %



Extended...

Data with reference to ...

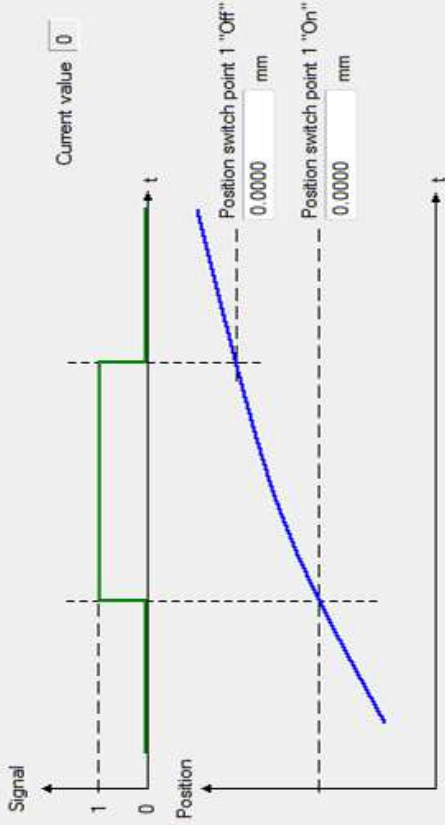
Load  
 Motor shaft  
 Data reference not uniform

Data refer automatically to load. Changes only via "Extended"

Negation of position, velocity and torque/force data

yes  
 no  
 Negation not uniform

- IndraDrive [1] default
  - ▶ Master Communication
  - ▶ Power Supply
  - ▶ Axis [1] default
    - ▶ Master Communication - Axis
    - ▶ Motor, Brake, Measuring Systems
      - ▶ Motor
      - ▶ Motor Temperature Monitoring
      - ▶ Motor Temperature Model
      - ▶ Brake
      - ▶ Brake Check
      - ▶ Motor Encoder
        - ▶ Motor Encoder
        - ▶ Motor Encoder Extended
        - ▶ Data Reference Motor Encod
        - ▶ Optional Encoder
          - ▶ **Position Switch Point**
          - ▶ Scaling / Mechanical System
          - ▶ Scaling / Units
          - ▶ Scaling / Units Extended
          - ▶ Mechanical Gear
        - ▶ Limit Values
          - ▶ Motion Limit Values
          - ▶ Torque / Force Limits
      - ▶ Drive Control
      - ▶ Operation Modes / Drive Halt
      - ▶ Error Reaction
      - ▶ Drive-Integrated Safety Technology
        - ▶ Probe
        - ▶ Optimization / Commissioning
          - ▶ Easy Startup Mode
          - ▶ Command Value Box
          - ▶ Drive-Integrated Command Value
          - ▶ Motor Data Identification
          - ▶ Automatic Setting of Axis Control...
          - ▶ Frequency Response Analysis
          - ▶ Axis Simulation



- IndraDrive [1] default
  - ▶ Master Communication
  - ▶ Power Supply
  - ▶ Axis [1] default
    - ▶ Master Communication - Axis
    - ▶ Motor, Brake, Measuring Systems
      - ▶ Motor
      - ▶ Motor Temperature Monitoring
      - ▶ Motor Temperature Model
      - ▶ Brake
      - ▶ Brake Check
      - ▶ Motor Encoder
        - ▶ Motor Encoder
        - ▶ Motor Encoder Extended
        - ▶ Data Reference Motor En
        - ▶ Optional Encoder
          - ▶ **Optional Encoder**
          - ▶ Optional Encoder Extended
          - ▶ Data Reference Optional I
        - ▶ Position Switch Point
      - ▶ Scaling / Mechanical System
        - ▶ Scaling / Units
        - ▶ Scaling / Units Extended
        - ▶ Mechanical Gear
      - ▶ Limit Values
        - ▶ Motion Limit Values
        - ▶ Torque / Force Limits
      - ▶ Drive Control
      - ▶ Operation Modes / Drive Halt
      - ▶ Error Reaction
      - ▶ Drive-Integrated Safety Technolog
        - ▶ Probe
      - ▶ Optimization / Commissioning
        - ▶ Easy Startup Mode
        - ▶ Command Value Box
        - ▶ Drive-Integrated Command Va
          - ▶ Motor Data Identification
          - ▶ Automatic Setting of Axis Cont

Optional encoder

No encoder

Position encoder type

Resolution: 0 DP/Rev

Rotary encoder  
 Linear encoder  
 Rotational direction inverted

Absolute encoder evaluation

Absolute encoder range: 0.0000 mm

Absol. enc. monitoring window: 1.0000 mm

Absolute encoder evaluation is possible  
 Force absolute encoder evaluation  
 Deactivate absolute encoder evaluation  
 Drive-cont: homing with abs. measuring system

Optional slot

Unassigned

Usage

Position control encoder

Feed constant: 10.0000 mm/Rev  
 Maintain position data reference when measuring wheel mode activated  
 Measuring wheel encoder position only initialized when position control encoder is switched

Optional Encoder Extended

- Drive [1] default
- Master Communication
- Power Supply
- Axis [1] default
- Master Communication - Axis
- Motor, Brake, Measuring Systems
  - Motor
  - Motor Temperature Monitoring
  - Motor Temperature Model
  - Brake
  - Brake Check
- Motor Encoder
  - Motor Encoder
  - Motor Encoder Extended
  - Data Reference Motor Encoder**
  - Optional Encoder
  - Position Switch Point
- Scaling / Mechanical System
  - Scaling / Units
  - Scaling / Units Extended
  - Mechanical Gear
  - Limit Values
  - Motion Limit Values
  - Torque / Force Limits
- Drive Control
  - Operation Modes / Drive Halt
  - Error Reaction
  - Drive-Integrated Safety Technology
  - Probe
- Optimization / Commissioning
  - Easy Startup Mode
  - Command Value Box
  - Drive-Integrated Command Value Generation
  - Motor Data Identification
  - Automatic Setting of Axis Control...
  - Frequency Response Analysis
  - Axis Simulation
- Special I/Os

**Reference travel direction**

Positive  
 Negative

**Evaluation of**

Reference mark (zero pulse)  
 Home switch

Positive edge  
 Negative edge

Limit switch as zero switch  
 Positive stop as zero switch

Reference cam shift:  mm

Home switch offset:  mm

**When homing ends**

Stop  
 Position at reference point

Offset:  mm

---

**Position**

Actual position value:  mm

Reference distance:  mm

**Homing**

Velocity:  mm/min

Acceleration:  mm/s<sup>2</sup>

Feedrate override:  %

Position window:  mm

Bipolar jerk limit value:  mm/s<sup>2</sup>

Optional encoder in reference  
 Reference encoder  
 Motor encoder  
 Optional encoder

Axis in reference

Clear Position Status [Set Absolute Position](#)

Drive-Controlled Homing Procedure

- Drive [1] default
  - Master Communication
  - Power Supply
  - Axis [1] default
    - Master Communication - Axis
    - Motor, Brake, Measuring Systems
      - Motor
      - Motor Temperature Monitoring
      - Motor Temperature Model
      - Brake
      - Brake Check
    - Motor Encoder
      - Motor Encoder
      - Motor Encoder Extended**
      - Data Reference Motor Encoder
    - Optional Encoder
    - Position Switch Point
    - Scaling / Mechanical System
      - Scaling / Units
      - Scaling / Units Extended
      - Mechanical Gear
    - Limit Values
      - Motion Limit Values
      - Torque / Force Limits
    - Drive Control
    - Operation Modes / Drive Halt
    - Error Reaction
    - Drive-Integrated Safety Technology
      - Probe
    - Optimization / Commissioning
      - Easy Startup Mode
      - Command Value Box
      - Drive-Integrated Command Value Generation
      - Motor Data Identification
      - Automatic Setting of Axis Control...
      - Frequency Response Analysis
      - Axis Simulation
    - Physical I/Os

**Properties**

Maximum travel range	36000.0000	mm
Multiplication	32768	
Internal position data format	131072	

Motor encoder gearbox

Motor-side	1
Encoder-side	1

Marker evaluation

Cyclic marker evaluation.

Marker position

	0.0000	mm
--	--------	----

[Motor Encoder](#)

**Motor encoder**

Resolver encoder (5Vvs, 10Vvs-Vers./8kHz)

Optional slot: X4 (EC)

**Position encoder type**

Resolution: 1 DP/Rev

Rotary encoder  
 Linear encoder  
 Rotational direction inverted

**Absolute encoder evaluation**

Absolute encoder range: 2.5000 mm

Absol. enc. monitoring window: 1.0000 mm

Absolute encoder evaluation is possible  
 Force absolute encoder evaluation  
 Deactivate absolute encoder evaluation  
 Drive-cortr. homing with abs. measuring system

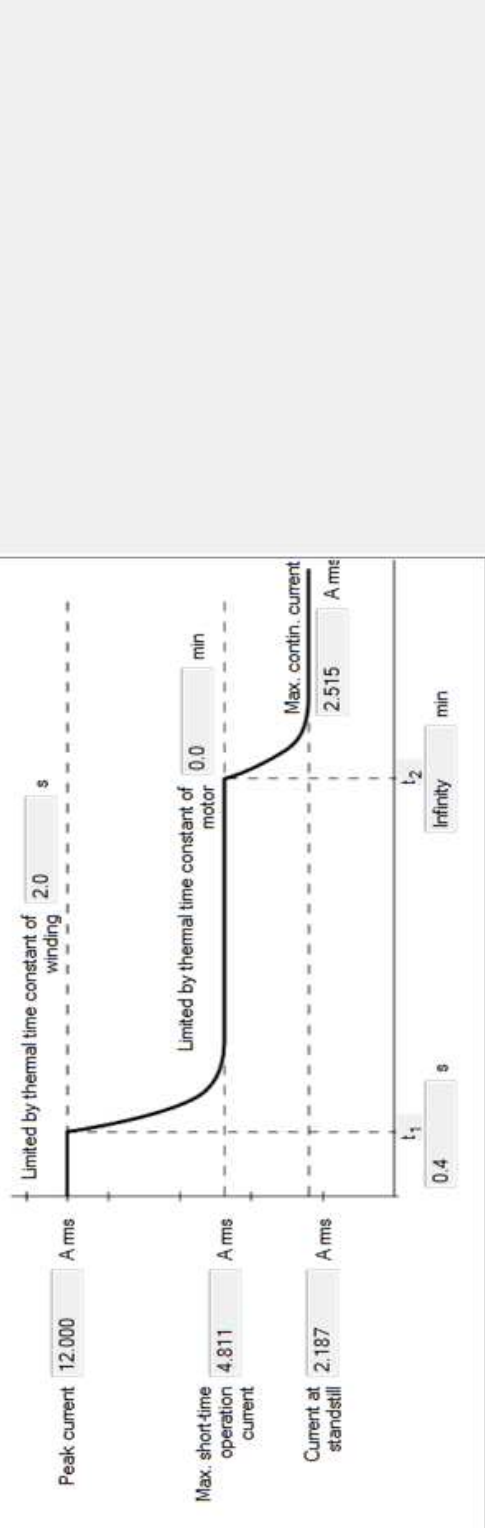
The rotational direction can be checked in the dialog [Motor data identification](#).

[Motor Encoder Extended](#)

- Drive [1] default
- Master Communication
- Power Supply
- Axis [1] default
- Master Communication - Axis
- Motor, Brake, Measuring Systems
  - Motor
  - Motor Temperature Monitoring
  - Motor Temperature Model
  - Brake
  - Brake Check
- Motor Encoder
  - Motor Encoder**
  - Motor Encoder Extended
  - Data Reference Motor Encoder
- Optional Encoder
- Position Switch Point
- Scaling / Mechanical System
  - Scaling / Units
  - Scaling / Units Extended
  - Mechanical Gear
- Limit Values
  - Motion Limit Values
  - Torque / Force Limits
- Drive Control
- Operation Modes / Drive Halt
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  - Probe
  - Optimization / Commissioning
  - Easy Startup Mode
  - Command Value Box
  - Drive-Integrated Command Value Generation
  - Motor Data Identification
  - Automatic Setting of Axis Control...
  - Frequency Response Analysis
  - Axis Simulation
- Physical I/Os



Motor temperature model Model parameters





Motor category: Synchronous third-party motor Date of motor database: 6/30/2015

Motor type:  Rotary  Linear

Rated motor speed	2500.0000 rpm	Number of pole pairs	8 Pole pairs
Maximum motor speed	8000.0000 rpm	Torque/force constant	0.41 Nm/A.ms
Motor peak current	12.000 A rms	Direct-axis induct. of motor	8.650 mH
Motor current at standstill	2.187 A rms	Quadrature-axis induct. of motor	8.650 mH
Nominal motor torque/force	1.170 Nm	Winding resistance	4.740 Ohm
Motor peak torque/force	4.000 Nm	Rotor inertia	0.33000000 kgm <sup>2</sup>
Flux-generating current, limit value	0.000 A rms	<input type="button" value="Calculate Motor Control Parameters"/> <input type="button" value="Form..."/>	
FXC: Minimum no-load current	0.218 A rms		
Temperature-dependent torque/force coefficient	10.0 %		
Speed-dependent torque/force coefficient	0.00000 Hz		

**⚠** Upon complete parameterization (encoder, scaling, etc.), the Motor data identification can be carried out for the purpose of optimization