DOCUMENTATION ISG-kernel

Functional description
Dynamic parameter

Short Description:
FCT-D1

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Preface

Legal information

This documentation was produced with utmost care. The products and scope of functions described are under continuous development. We reserve the right to revise and amend the documentation at any time and without prior notice.

No claims may be made for products which have already been delivered if such claims are based on the specifications, figures and descriptions contained in this documentation.

Personnel qualifications

This description is solely intended for skilled technicians who were trained in control, automation and drive systems and who are familiar with the applicable standards, the relevant documentation and the machining application.

It is absolutely vital to refer to this documentation, the instructions below and the explanations to carry out installation and commissioning work. Skilled technicians are under the obligation to use the documentation duly published for every installation and commissioning operation.

Skilled technicians must ensure that the application or use of the products described fulfil all safety requirements including all applicable laws, regulations, provisions and standards.

Further information

Links below (DE)

https://www.isg-stuttgart.de/produkte/softwareprodukte/isg-kernel/dokumente-und-downloads

or (EN)

https://www.isg-stuttgart.de/en/products/softwareproducts/isg-kernel/documents-and-downloads

contains further information on messages generated in the NC kernel, online help, PLC libraries, tools, etc. in addition to the current documentation.

Disclaimer

It is forbidden to make any changes to the software configuration which are not contained in the options described in this documentation.

Trade marks and patents

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General and safety instructions

Icons used and their meanings

This documentation uses the following icons next to the safety instruction and the associated text. Please read the (safety) instructions carefully and comply with them at all times.

Icons in explanatory text

➢ Indicates an action.

⇨ Indicates an action statement.

⚠ DANGER

Acute danger to life!

If you fail to comply with the safety instruction next to this icon, there is immediate danger to human life and health.

⚠ CAUTION

Personal injury and damage to machines!

If you fail to comply with the safety instruction next to this icon, it may result in personal injury or damage to machines.

Attention

Restriction or error

This icon describes restrictions or warns of errors.

Notice

Tips and other notes

This icon indicates information to assist in general understanding or to provide additional information.

Example

General example

Example that clarifies the text.

Programing Example

NC programming example

Programming example (complete NC program or program sequence) of the described function or NC command.

Release Note

Specific version information

Optional or restricted function. The availability of this function depends on the configuration and the scope of the version.

Table of contents

List of figures

1 Overview

Task

The CNC controller calculates a path setpoint profile so that the programmed path contour can be travelled at a specific velocity. The individual NC axes are accelerated and decelerated at specified acceleration values. Which dynamic settings on a machine produce the best results with regard to machining time and path accuracy depends on the following influences, among others:

- Load capacity of the machine construction
- Machine vibration response
- Drive motor torque response
- Drive controller power limit

This function description describes the parameter definitions of the dynamic response of motion control.

When calculating the profile, the CNC takes into account every machine axis participating in the motion. The path velocity may have to be reduced so as to maintain the axis-specific velocity and acceleration values. The machine axis with the poorest dynamics and the largest relative path distance ultimately defines the maximum possible path velocity.

Effectiveness

The axis-specific dynamic characteristics are parameters that apply to a single machine axis. If several NC axes interact in the path compound (path mode), the axis with the weakest dynamics and the largest relative path distance defines the overall path dynamics.

Parameterisation

Dynamic variables are parameterised for every NC axis in the axis parameter list [AXIS].

The default type of the acceleration profile with the associated weighting effect are parameterised in the channel-specific parameter list [CHAN]. The specific additional dynamic parameters for spindle axes, for example the characteristic profile-controlled acceleration, are described in [FCT-S1].

Mandatory note on references to other documents

For the sake of clarity, links to other documents and parameters are abbreviated, e.g. [PROG] for the Programming Manual or P-AXIS-00001 for an axis parameter.

For technical reasons, these links only function in the Online Help (HTML5, CHM) but not in pdf files since pdfs do not support cross-linking.

2 Description

2.1 General dynamics characteristics

2.1.1 Limits

The parameters listed below describe dynamic limits of an NC axis. They act as upper or lower limits for further parameters which can also be changed in the NC program to some extent.

Therefore, when the acceleration and ramp time values described in the following sections are weighted with the G functions G130 - G133 PROG, the minimum permissible ramp time cannot be undershot and the maximum permissible acceleration cannot be overshot.

- Maximum permissible axis acceleration (P-AXIS-00008)
- Minimum permissible ramp time (P-AXIS-00201)
- Maximum permissible axis velocity (P-AXIS-00212)

Notice

Note the following with regard to the maximum axis velocity P-AXIS-00212:

- For G01 or G00 motions, this value represents the upper limit that can be reached by programming the F word or G00.
- With translatory or rotary axes (no spindles), it can be assumed that the resolution limits of the measuring system are taken into account in the setting.
- With spindle axes, the limit velocity for the measurement system P-AXIS-00220 is set as the maximum axis velocity.

2.1.2 Further limits

Maximum permissible velocity override in the channel P-CHAN-00056 or axis P-AXIS-00109

The parameter P-CHAN-00056 is used to limit the channel-specific velocity override. This value is active for path motions (axes of a channel in the path compound).

The parameter P-AXIS-00109 is used to limit the axis-specific velocity override (independent axes).

Rapid mode velocity P-AXIS-00209

The parameter P-AXIS-00209 defines the velocity for positioning in rapid traverse (G00).

With G00 motions, the CNC calculates a rapid traverse velocity regardless of the programmed F word based on the axis-specific rapid traverse velocities. This rapid traverse velocity is used with G00 programming.

Reduced velocity with G01, G02, G03 P-AXIS-00214 and G00 P-AXIS-00155

The CNC takes these maximum velocity values into account after activation by a PLC control signal. This permits motion at reduced velocity, for example when guard doors are open.

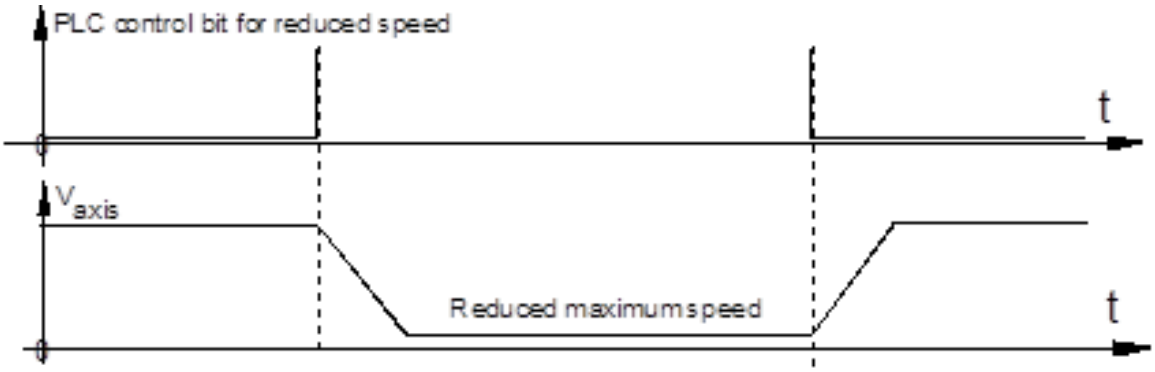

Fig. 1: Reduced maximum velocity

Reduced velocity in safety zone P-AXIS-00030

The CNC takes this maximum velocity value into account after activation by a PLC control signal whenever the axis is within a specific position range. This permits motion at reduced velocity, for example within a safety zone.

2.2 Acceleration profiles

Selecting the acceleration profile defines the velocity on the programmed path, provided

- the specified permissible velocities,
- the accelerations and
- the set jerk are maintained.

The following modes are available :

- Step-shaped acceleration profile with restriction of acceleration without limiting the jerk
- Trapezoidal acceleration profile
- Sine-square acceleration profile

Depending on the acceleration profile selected, the acceleration is set as shown in the acceleration profile below:

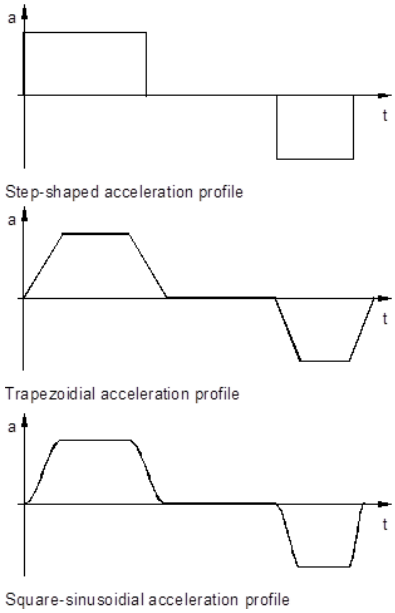

Fig. 2: Path acceleration profiles

The NC controller calculates the path distance to be output in the current cycle for the programmed path based on distance data, velocity inputs in the NC program and the dynamic variables of the machine axes.

Planning the resulting velocity profile extends over several blocks and ensures that stopping is possible at all times without overshooting the permissible dynamic limits (look ahead).

2.2.1 Parameterisation

Selecting the default acceleration profile

In the channel parameter lists [CHAN] select the default acceleration profile with the parameter P-CHAN-00071. The default acceleration profile is active if no other profile is selected within the NC program.

Example

Parameterisation example 1

Excerpt from the channel parameter list

```
…
prog_start.slope.profile      0
…
```

The acceleration profile can be changed as required for this channel in the NC program by means of the modal command #SLOPE[TYPE=...] [PROG].

Example

Parameterisation example 2

Excerpt from the NC program

```
…
N20 #SLOPE[TYPE=TRAPEZ]
N30 G01 G90 X10 Y10 F5000
```

Motion blocks after block number N20 are moved with a trapezoidal acceleration profile.

Independent axes

For independent axes, the acceleration profile can be parameterised in the NC program by means of the SLOPE_TYPE keyword within the axis-specific programming command [PROG//Independent axes].

2.2.2 Step-shaped acceleration profile

Description and properties

Therefore, select this profile to obtain the shortest possible positioning times.

This profile is used very frequently and has a stepped acceleration profile. This results in dynamic motion segments for individual axes which are controlled at a linear velocity rise/drop over time. At the start of the block, acceleration takes place up to the programmed feed rate, followed by deceleration at the maximum permissible acceleration towards the end of the block.

Returns occur during axis acceleration ramp-up and deceleration. This is due to the stepped acceleration profile. This response can have a negative impact on machine constructions that are subject to critical vibrations. However, the great advantage lies in the optimum distance/time response, i.e. the time needed for a path motion segment is the shortest compared to other acceleration profiles.

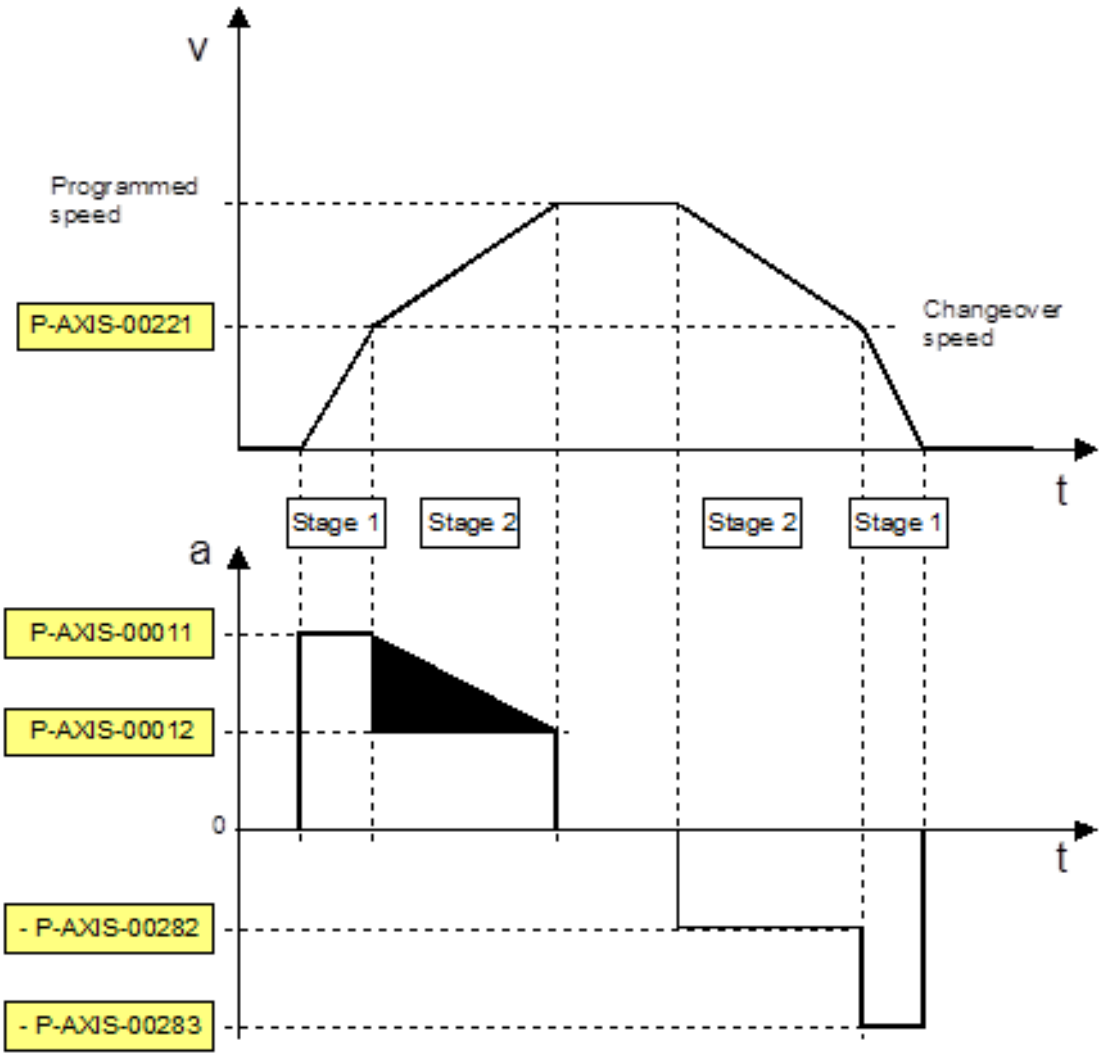

Fig. 3: Parameters of the linear velocity profile

Parameterisation

During both start-up and deceleration, the acceleration profiles each consist of 2 steps which can be parameterised with 2 different acceleration values.

- Step 1 is accelerated and decelerated at the acceleration value of P-AXIS-00011.
- Step 2 is accelerated and decelerated at the acceleration value of P-AXIS-00012.

The parameter P-AXIS-00221 sets the changeover velocity from one acceleration value to the other. The linear velocity profile and the stepped acceleration profile of a typical parameterisation variant are depicted in the above figure “Parameters of the linear velocity profile”. Of course, another possible setting is where acceleration value 1 is less than acceleration value 2.

Parameterisation for rapid traverse (G00)

Another parameter set is available for dynamic motion segments with active rapid traverse (G00).

- The acceleration value P-AXIS-00005 is active in step 1.
- The acceleration value P-AXIS-00006 is active in step 2.

The changeover velocity can be defined by the parameter P-AXIS-00211 in rapid traverse.

Parameterisation for feedhold

The acceleration value for feedhold to decelerate the axis to standstill is set by the parameter P-AXIS-00024.

The influence of channel parameter P-CHAN-00097 must be taken into account.

2.2.3 Jerk-limited default acceleration profile

Description and properties

Both for

- axes in the path group and for
- independent axes

a jerk-limited acceleration can be selected with a trapezoidal or sine-square profile.

Parameterisation is identical and axis-specific for both profiles. As opposed to the trapezoidal profile, the sine-square profile permits softer acceleration and deceleration.

With jerk-limited acceleration, the path motion is controlled so that axis-specific accelerations do not suffer any abrupt changes.

For HSC contour machining, a special jerk-limited slope can be selected to optimise block global acceleration.

These profiles must be used with machine constructions that are subject to critical vibrations. The ramp times for building up and reducing acceleration should only be set as high as necessary and as low possible because these parameters have a considerable influence on positioning times.

The jerk-limited acceleration profile can be displayed in 7 segments (see figure below “Parameters with jerk-limited acceleration profile”).

I	Velocity increase at increasing acceleration to a maximum acceleration value within a specified time.
II	Velocity increase at constant acceleration.
III	Velocity increase at decreasing acceleration down to the acceleration value 0 within a specified time.
IV	Phase at constant velocity, acceleration 0
V	Velocity decrease at increasing deceleration to a maximum deceleration value within a specified time.
VI	Velocity decrease at constant deceleration.
VII	Velocity decrease at decreasing deceleration down to the deceleration value 0 within a specified time.

The parameters in segments I, III, V and VII determine the axis jerk caused by the acceleration profile.

Advantages

The advantage of jerk-limited acceleration profiles are:

- Better use of available machine dynamics (e.g. positioning in rapid traverse)
- Reduced wear and tear on mechanical systems by avoiding impacts
- Low excitation of vibrations
- Improved possibility of parameterising path enhancement (e.g. feedforward control)

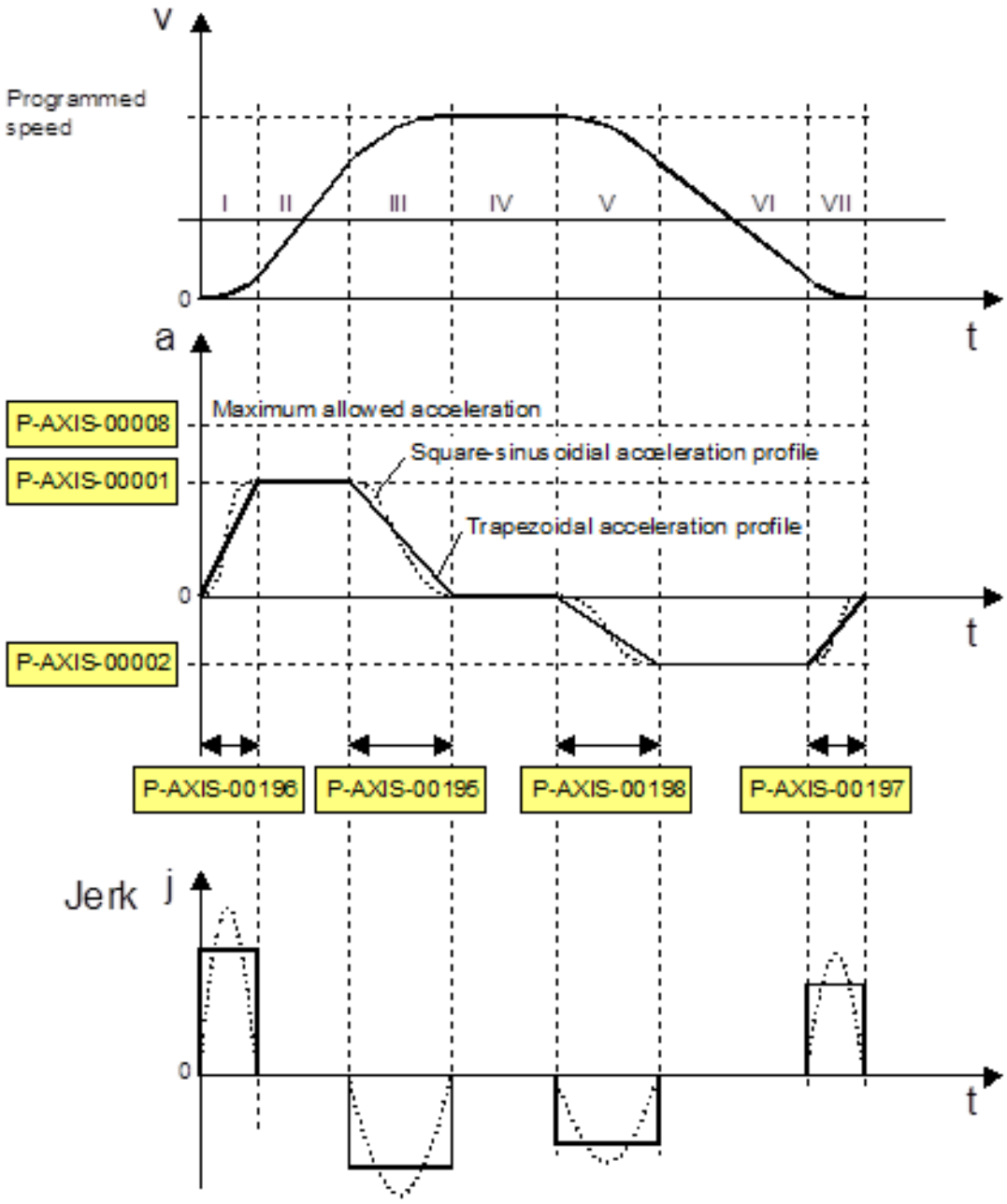

Fig. 4: Parameters for jerk-limited acceleration profile

Parametrisation

The axis-specific acceleration ramps of jerk-limited acceleration profiles are defined by specifying a maximum acceleration and a maximum ramp time. The figure above shows the profiles of velocity, acceleration and jerk with corresponding parameters.

An individual acceleration ramp can be set for each acceleration and deceleration phase using the parameters listed.

Maximum acceleration at increasing velocity:	P-AXIS-00001
Maximum deceleration at decreasing velocity:	P-AXIS-00002
Maximum ramp time	P-AXIS-00195 P-AXIS-00196 P-AXIS-00197 P-AXIS-00198

When parameterising ramp time, take into account the fact that the jerk-limited acceleration profile degrades into a stepped acceleration profile at ramp times less than the CNC cycle time.

Parameterisation for rapid traverse (G00)

The jerk-limited acceleration profile with steeper acceleration ramps can be defined for rapid traverse motions (G00). All acceleration ramps (segments: I, III, V and VII) are parameterised at maximum acceleration P-AXIS-00004 and maximum ramp time P-AXIS-00200 (see figure below).

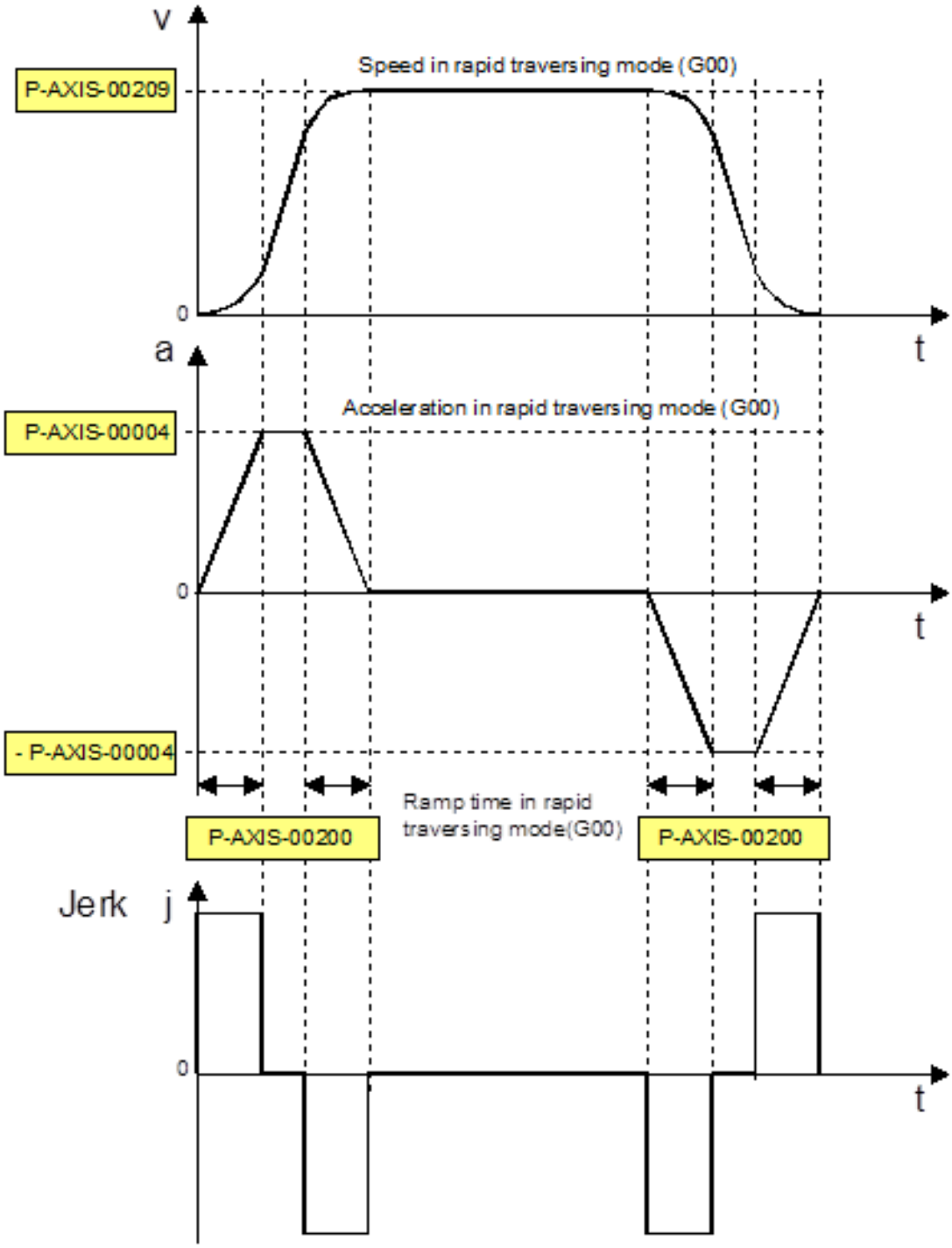

Fig. 5: Parameters for jerk limitation in rapid traverse (G00)

Parameterisation for feedhold

Acceleration ramps (segments I, III, V and VII) are parameterised at maximum acceleration P-AXIS-00053 and maximum ramp time P-AXIS-00081 for rapid deceleration on feed stop (feed-hold).

The influence of the channel parameter P-CHAN-00097 must be considered.

2.2.4 Jerk-limited HSC acceleration profile

Description and properties

This profile can be activated for path motions and offers advantages for short blocks when acceleration must be built up and decreased over a relatively large number of blocks.

Parameterisation of acceleration ramps with feed blocks is identical to default jerk-limited profiles. However, the parameterisation of different acceleration and deceleration values is less practical for HSC machining.

Setting profile parameters for a rapid traverse block and feedhold also correspond to a default jerk-limited profile.

There are differences in the effectiveness of ramp time parameters for feed blocks.

The maximum of the following parameters is used as ramp time:

- P-AXIS-00195
- P-AXIS-00196
- P-AXIS-00197
- P-AXIS-00198

Build-up and decrease times for acceleration and deceleration are then identical.

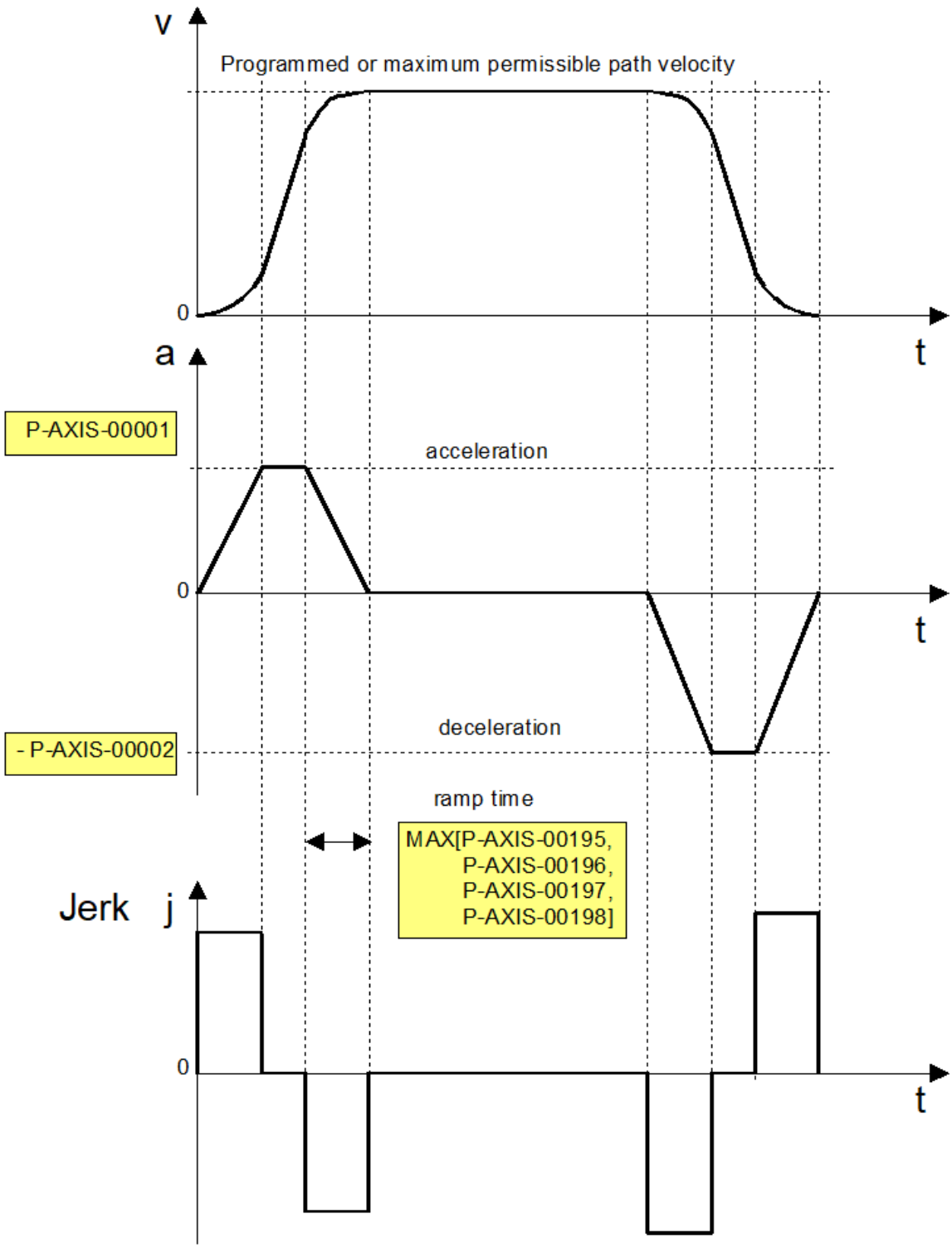

Fig. 6: Parameters with HSC jerk limitation and feed block

Determining ramp time

When the maximum permissible acceleration and the maximum permissible jerk are specified, the ramp time can be determined using the following equation:

$$t_r = \frac{a}{j}$$

where tr: ramp time, j: permissible jerk, a: permissible acceleration

Example

Determining ramp time

a: 1000 mm/s^2, j: 20m/s^3

```
getriebe[0].slope_profil.a_grenz     1000
getriebe[0].slope_profil.tr_grenz    50000
```

In many cases, there are no jerk values available for a machine. In this case, the ramp times must be increased empirically starting from default parameter values until the axis can move without exciting vibrations.

The ramp times should be set as small as possible and only as large as necessary since they influence positioning times.

2.3 Jerk limitation and path

Notice

The parameters described below are relevant only in conjunction with jerk-limited acceleration profiles.

2.3.1 Path profile with non-tangential continuous block limits

Description

Axis acceleration jerks occur at **non-**tangential continuous block transitions of paths, e.g. linear blocks with a prismatic workpiece. This results in very pronounced axis jerks if the path velocity is not reduced to 0 at the block transition.

Nevertheless, the controller ensures that acceleration jerks remain below the maximum acceleration of the affected axes.

This response is shown below by the example of a 45° knee angle in the velocity, acceleration and jerk profiles between two linear axes.

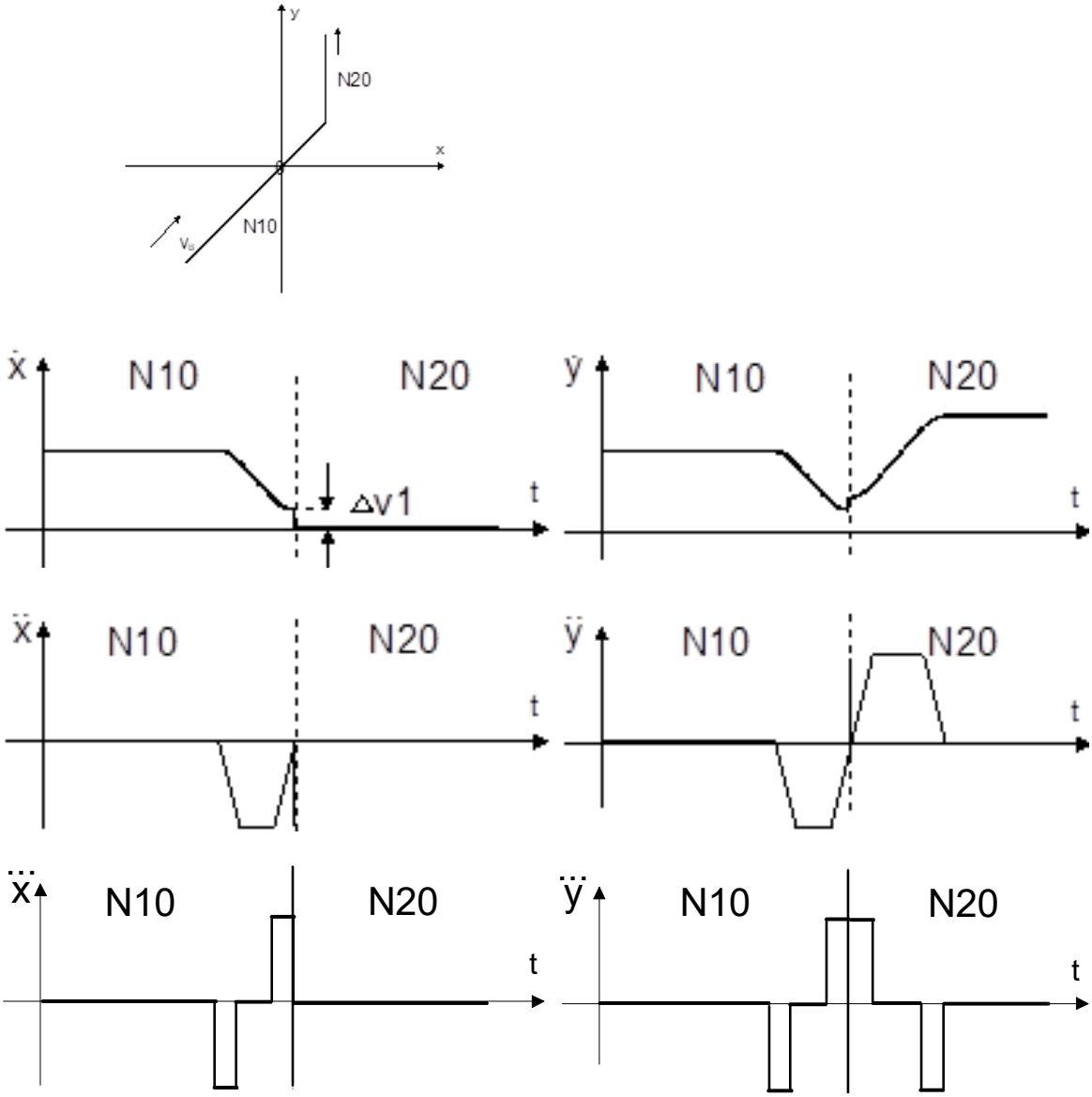

Fig. 7: Non-tangential continuous linear block transition

Parameterisation

Parameter P-AXIS-00013 weights the permissible acceleration at the block transition.

The jerk limit is activated by the value 0. The weighting of the permissible acceleration is applied with a factor of cycle/ramp time. This maintains values within the permissible axis jerk. Result is a very low speed at the motion block transition.

Set this parameter high if higher velocities are required for motions with higher axis jerk at block transitions. At a value of 1000 (upper limit), maximum acceleration is maintained at the block transition and the jerk exceeds the set limits.

*atrans = a * (P-AXIS-00013) / 1000.*

jtrans = atrans /tzykl.

A value > 0 may be practical if, for technological reasons, a drop in path velocity is not desirable at slightly discontinuous block transitions depending on the set acceleration.

A value < 1000 may be practical when the machine is highly prone to critical vibrations.

The figure below illustrates the influence of jerk limitation when P-AXIS-00013 = 0 on the block transition velocity between two non-tangential continuous motion blocks and different knee angles.

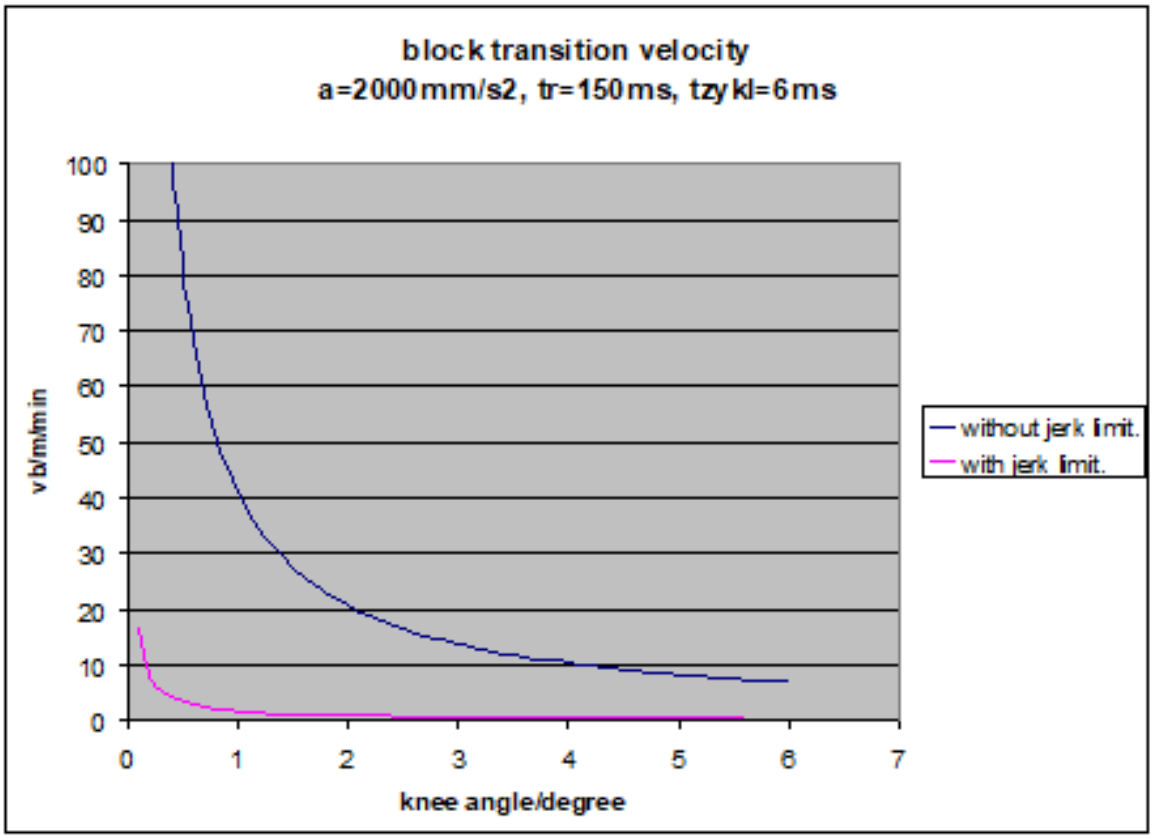

Fig. 8: Influence of jerk limitation on block transition velocity

Example

Parameterisation example

Excerpt from the axis parameter list:

with jerk limitation

```
getriebe[0].dynamik.a_trans_weight      0
```

without jerk limitation

```
getriebe[0].dynamik.a_trans_weight      1000
```

2.3.2 Path profile with tangential continuous block transitions

Description

A jerk in axis acceleration occurs

- at linear to circular block transitions and vice versa,
- circular/circular paths with a change in radius and
- a change in direction of rotation

with tangential continuous block transitions. This is linked to a relatively large axis jerk even if the path velocity is constant. Below are several examples showing velocity, acceleration and jerk in the axes:

Example

Block transition linear block -> circular block

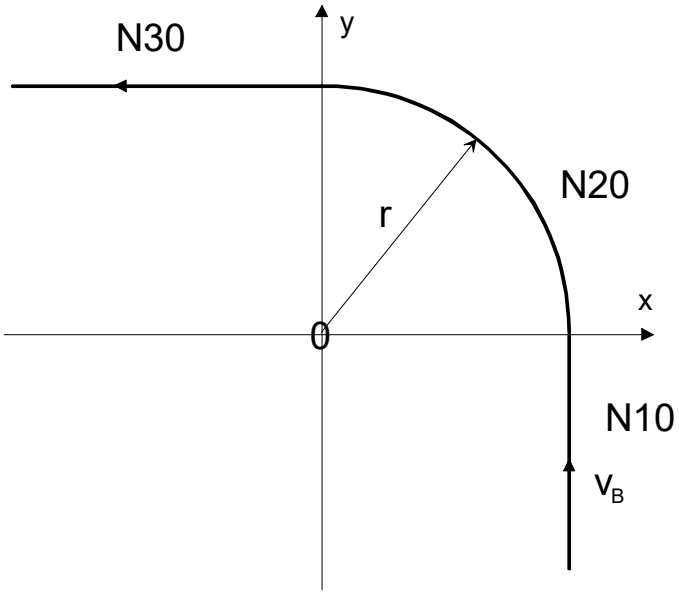

Fig. 9: Tangential continuous block transition from linear block to circular block

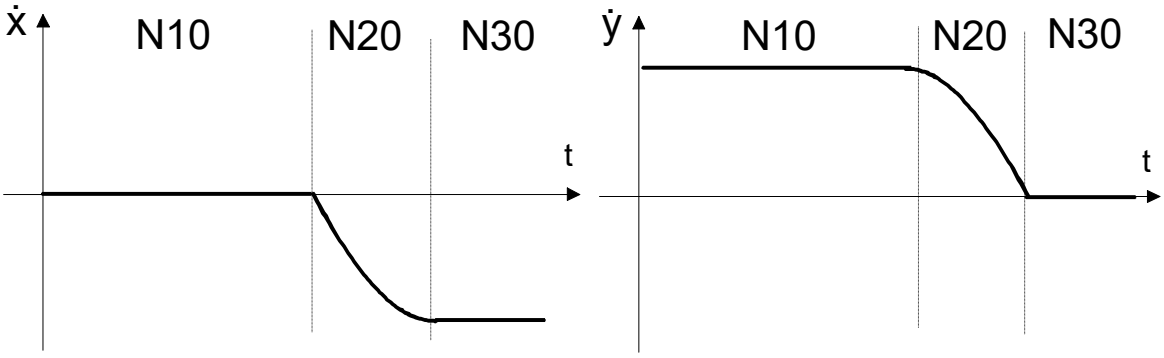

Fig. 10: Velocity profile on X and Y axes

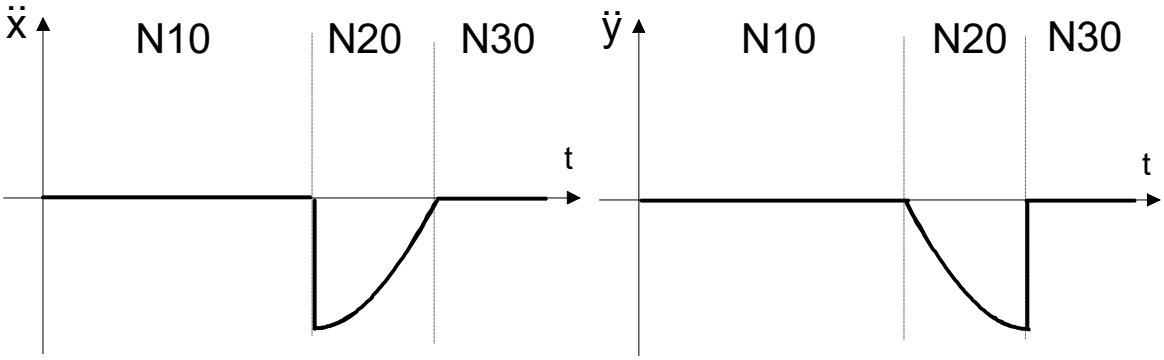

Fig. 11: Acceleration profile on X and Y axes

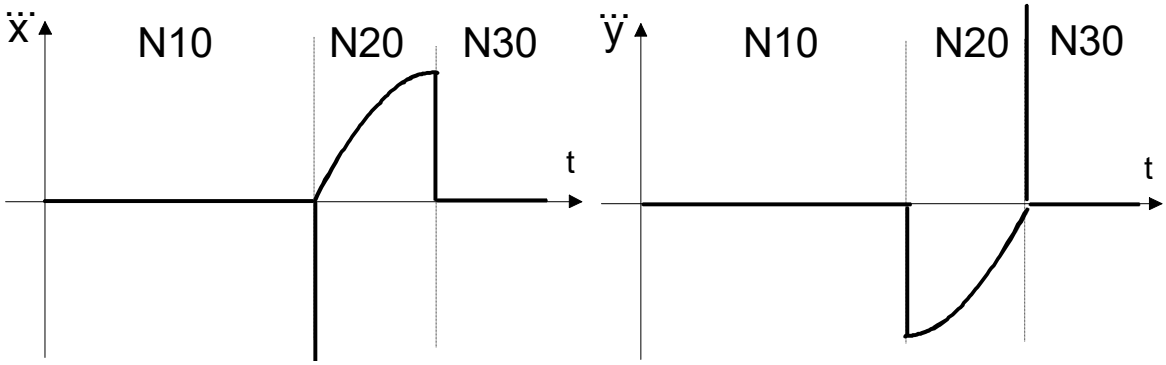

Fig. 12: Jerk profile on X and Y axes

Example

2. Block transition circular block -> circular block with change in direction of rotation G03 -> G02

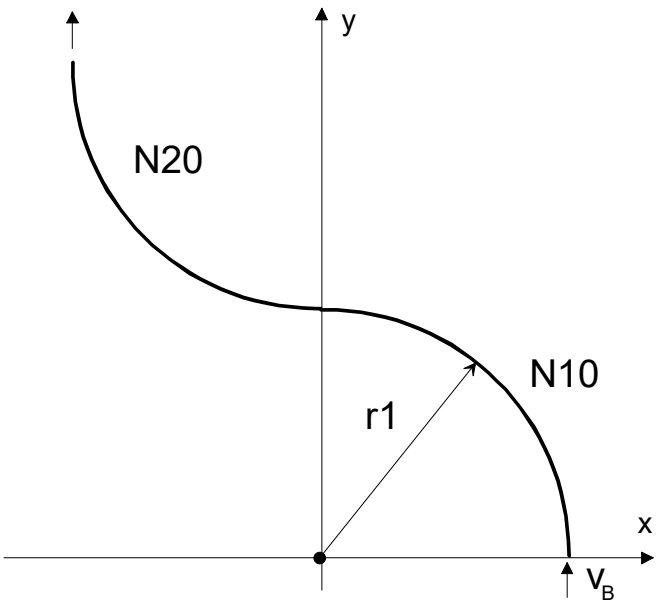

Fig. 13: Tangential continuous block transition from circular block to circular block

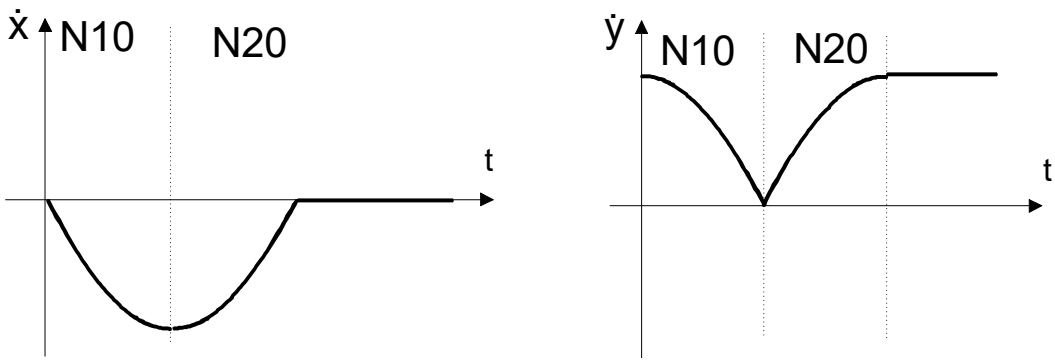

Fig. 14: Velocity profile on X and Y axes

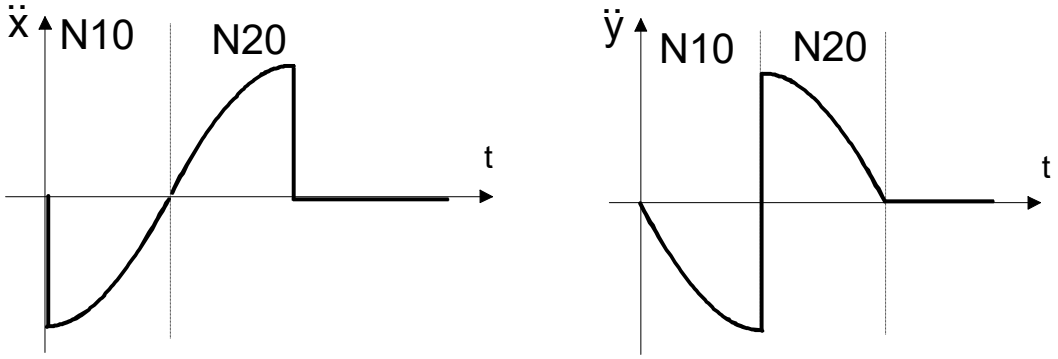

Fig. 15: Acceleration profile on X and Y axes

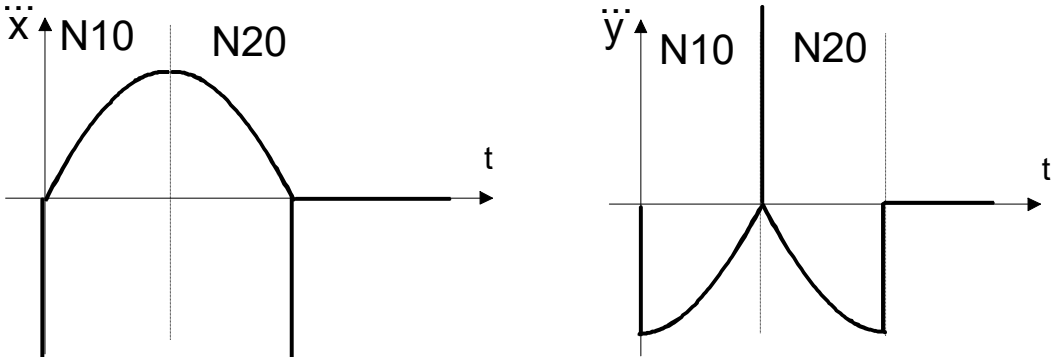

Fig. 16: Jerk profile on X and Y axes

Example

3. Block transition circular block -> circular block with radius change r2 != r1

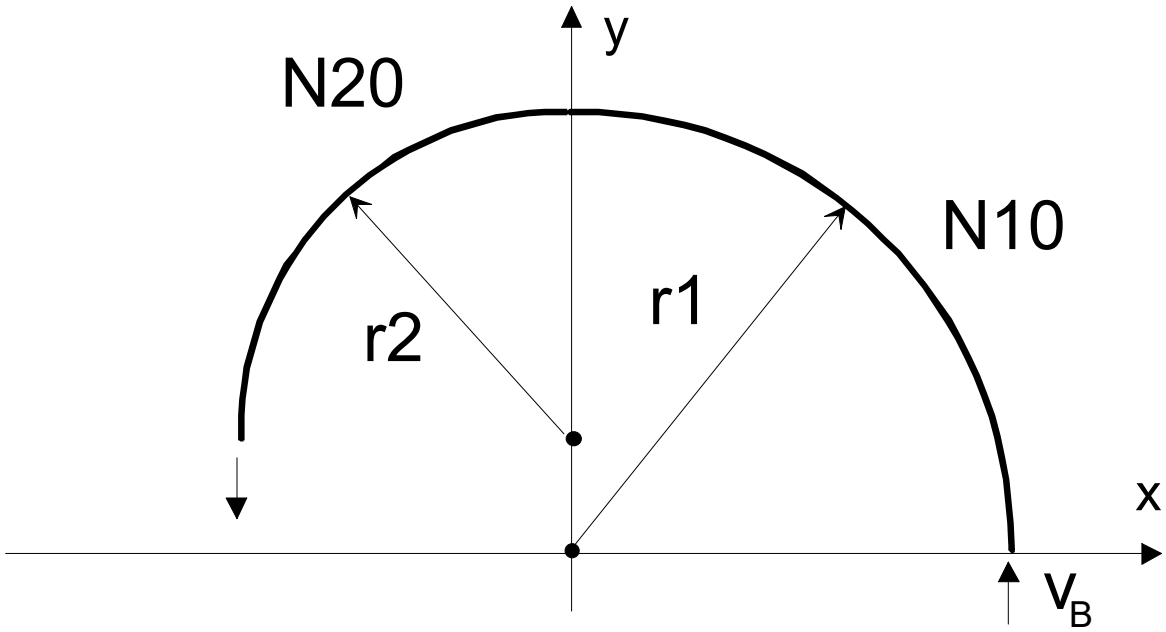

Fig. 17: Tangential continuous block transition from circular block to circular block with radius change

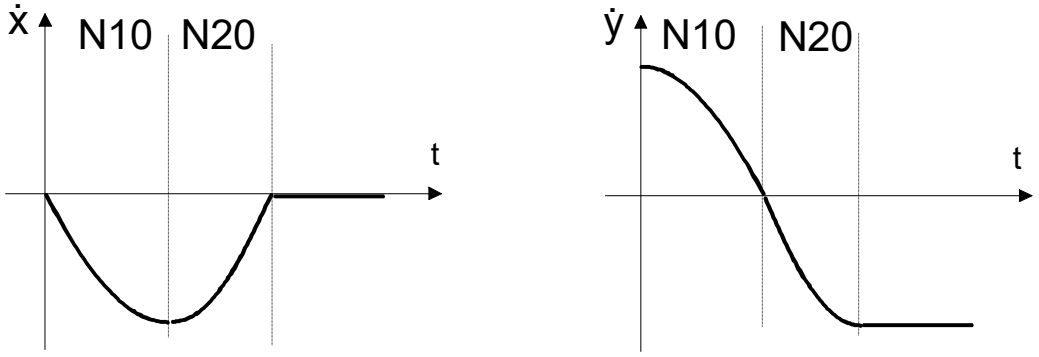

Fig. 18: Velocity profile on X and Y axes

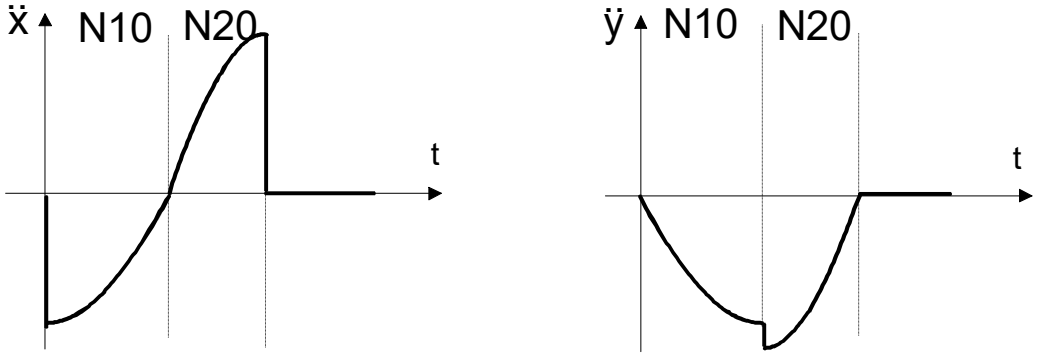

Fig. 19: Acceleration profile on X and Y axes

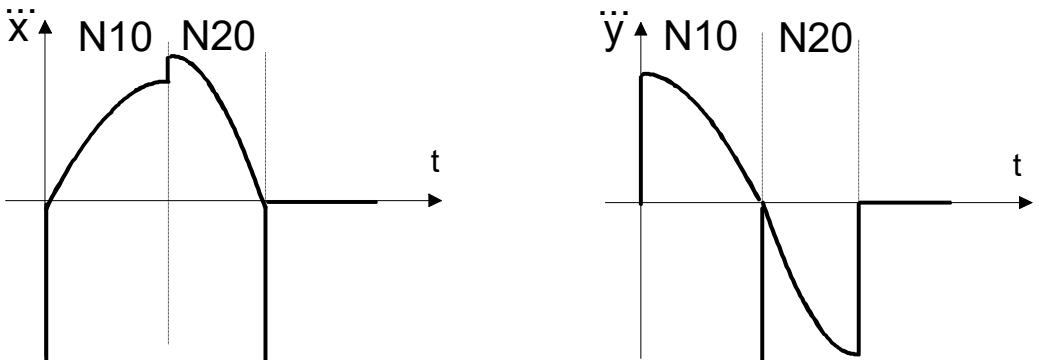

Fig. 20: Jerk profile on X and Y axes

Parameterisation

Jerk limitation at tangential continuous block transitions can be activated and deactivated by the channel parameter P-CHAN-00009.

The parameter P-AXIS-00154 weights the permissible jerk at the block transition of tangential continuous paths.

The parameter value 1000 has the lowest influence on velocity at the block transition. Jerk is high and corresponds to the ratio between current acceleration and cycle time.

Values smaller than 1000 result in a further reduction in velocity at the block transition.

The value 0 leads to a velocity reduction so that the permissible jerk at the block transition is maintained based on the ramp times parameters P-AXIS-00195 to P-AXIS-00198 and acceleration parameters P-AXIS-00011 and P-AXIS-00012.

jtrans = (P-AXIS-0004 / tr)(P-AXIS-00154) / 1000.*

A value > 0 or a restricted jerk limitation at tangential continuous block transitions may be practical if, for technological reasons, it is not desirable for a drop to occur in path velocity at tangential continuous block transitions irrespective of the jerk setting. This may be the case, for example, in wood machining applications to avoid burn marks caused by extremely slow motion.

A value < 1000 may be practical if the machine structure is highly prone to critical vibrations and, taking technology aspects and machining time into account, if it is permissible to set a relatively low value for the path velocity at tangential continuous block limits.

The figure below shows the influence of jerk limitation on the path velocity profile for a tangential continuous path with linear and circular blocks. It is assumed that the path velocity inside the circle is reduced due to the permissible axis acceleration values.

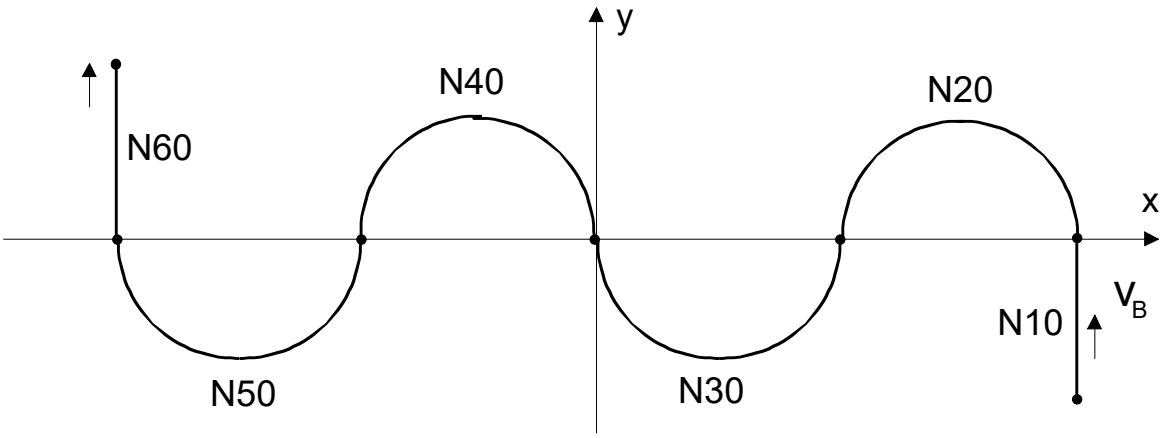

Fig. 21: Path velocity profile

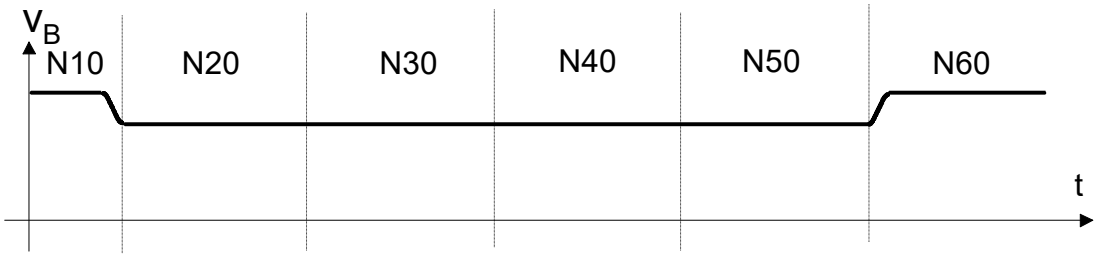

Fig. 22: without jerk limitation at block transition

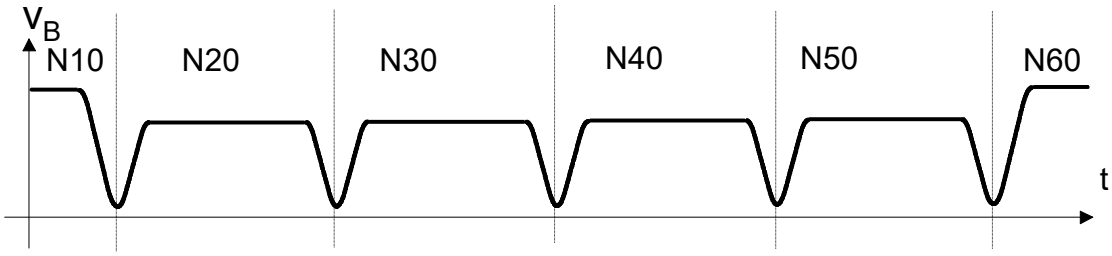

Fig. 23: with jerk limitation at block transition

Example

Parameterisation example

Jerk limitation at block transition:

Excerpt from the axis parameter list:

```
getriebe[0].dynamik.a_trans_weight      0
getriebe[0].dynamik.r_trans_weight      0
```

Extract from the channel parameters list

```
corr_v_trans_jerk          1
```

No jerk limitation at block transition:

```
getriebe[0].dynamik.a_trans_weight    1000
getriebe[0].dynamik.r_trans_weight    1000
```

Notice

If a nominal path deviation is permitted, it is generally possible to move at a higher block transition velocity at path knees or tangential continuous transitions with activated jerk limitation by using path-influencing processes, e.g. polynomial contouring.

As indicated in the note, the diagram below shows a non-tangential continuous block transition with a knee angle of 1°. As opposed to a block transition velocity without contouring, it is possible here to move at a relatively high path velocity at the block transition in the event of a relatively small path error.

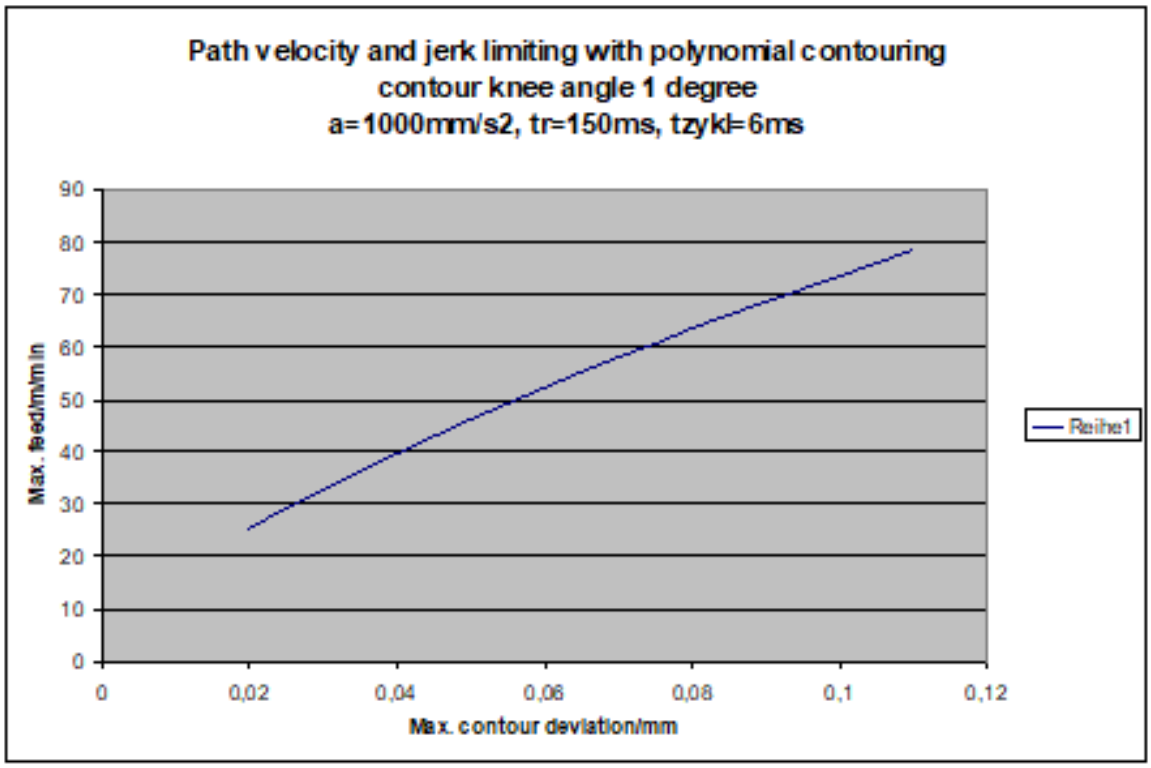

Fig. 24: Path velocity due to jerk limitation with transition polynomial

2.3.3 Jerk limitation within the path

Parameterisation

The parameter P-AXIS-00199 defines the ramp time of geometrical paths.

When a path passes through a circle or a polynomial at a constant feedrate, this parameter can limit the maximum occurring jerk resulting from the path curvature. The influence of curvature changes on jerk at the start and end of a path segment is not considered here.

With polynomial paths, the influence of parameter P-CHAN-00110 must also be taken into consideration.

The permissible jerk caused by geometrical paths results from the default setting in

- parameter P-AXIS-00199 and the
- acceleration parameters P-AXIS-00011, P-AXIS-00012 and P-AXIS-00004

depending on the motion block type as follows:

$$j_{geom} = \frac{a}{tr_{geom}}$$

Example

Feed block: $a=1m/s^2$, tr_{geom}. = 0.1s, $j_{geom} = 10m/s^3$

Rapid traverse block: $a=2m/s^2$, tr_{geom}. = 0.1s, $j_{geom} = 20m/s^3$

Excerpt from the axis parameter list:

```
getriebe[0].slope_profil.a_beschl   1000
getriebe[0].slope_profil.a_brems    1000
getriebe[0].slope_profil.a_grenz    2000

.........
getriebe[0].dynamik.tr_geom         100000
```

2.4 Emergency stop acceleration

Parametrisation

The parameter P-AXIS-00003 defines the acceleration used in an emergency.

With certain faults, the CNC executes the emergency reaction with fault reaction class 4. In this case, the CNC changes to the stepped acceleration profile regardless of the current acceleration profile activated and decelerates **specific axes** at this deceleration.

The axis leaves the path contour.

Example

Emergency acceleration

Excerpt from the axis parameter list:

```
getriebe[0].dynamik.a_emergency    5000
```

2.5 Selecting/modifying the acceleration profile

2.5.1 Profile type and weighting effect, parameterising channel parameters

Effect of ramp time weighting

The parameter P-CHAN-00073 from the channel parameter list can be set to the acceleration ramp on which the ramp time weighting values of the NC functions G132 and G133 PROG are to act. This parameter has a modal effect.

Effect of acceleration weighting

The parameter P-CHAN-00001 from the channel parameter list can be set to the acceleration on which the ramp time weighting values of the NC functions G130 and G131 PROG are to act. This parameter has a modal effect.

Example

Selecting/modifying the acceleration profile

Activate the stepped acceleration profile as default when the program is started. The weighting has an effect on all acceleration values.

Excerpt from the channel parameter list:

```
prog_start.slope.profile            0
prog_start.slope.acceleration       0
```

Initialise the trapezoidal acceleration profile when the program is started. The ramp time weighting has an effect on all ramp times. The acceleration weighting acts on the acceleration at decreasing velocity P-AXIS-00002.

Excerpt from the channel parameter list:

```
prog_start.slope.profile            1
prog_start.slope.ramp_time          0
prog_start.slope.acceleration       2
```

2.5.2 Path-specific dynamic limit, parameterising channel parameters

If for technological reasons the **path velocity** Is not permitted to exceed certain limits regardless of the F word programmed, the parameter P-CHAN-00090 can be used to define a maximum value. This may be the case, for example, if a plasma torch should not cut through at excessive velocity in metal machining applications. When activated in the NC program, the path velocity calculated by the CNC is limited.

If for technological reasons the **path acceleration** Is not permitted to exceed certain limits, the parameter P-CHAN-00002 can be used to define a maximum value. When activated in the NC program, the path acceleration calculated by the CNC is limited.

The parameter P-CHAN-00351 sets the unit for acceleration. The parameter P-CHAN-00350 sets the additional influence of acceleration limitation on circle geometry elements.

Example

Path-specific dynamics limitation

Excerpt from the channel parameter list:

```
vector.velocity                1500
vector.acceleration            1000
vector.acc_dec_unit            MM_S2
vector.cir_radial_acc_limit    0
```

The #VECTOR LIMIT ON[ACC... VEL..] commands activate the path-specific dynamic limitation [PROG].

The operating principle of path acceleration limitation can be influenced by keywords in the command. Limitation then acts

- either only on feed blocks
- or only on rapid traverse blocks
- or on both block types.

This does not affect dynamics limitation due to axis-specific limits.

Notice

The use of path-specific limitation functions listed above and depending on the parameter P-CHAN-00097 can result in considerable lengthening of the deceleration distance with feed blocks.

It is therefore recommended to set the P-CHAN-00097 parameter to 1 when the acceleration limitation functions listed above are used.

Example

Excerpt from the channel parameter list:

```
use_drive_curr_limit         1
```

2.6 Dynamic limits for manual mode

2.6.1 Parameterising the axis parameters G200

G200: Exclusive manual mode

When exclusive manual mode G200 is active, the profile curve is dependent on the ramp times P-AXIS-00359 and P-AXIS-00360. The value P-AXIS-00360 is used when feedhold is active.

If these values are set to 0, acceleration increases in steps and assumes

- the value P-AXIS-00009 in normal mode
- and the value P-AXIS-00259 with feedhold.

In the other case, the corresponding acceleration is increased and decreased linearly over time (trapezoidal shape). Ramp time parameters can be set regardless of the parameters for path motion.

- Take P-AXIS-00009 into consideration as maximum value for acceleration.
- Take P-AXIS-00213 into consideration as maximum value for velocity.

In addition, the delay can be set in P-AXIS-00541.

The parameter P-AXIS-00541 defines the active acceleration when the PLC signal for reduced acceleration is active (Control Unit gpCh[*ChIdx*]^.bahn_mc_control.reduced_acceleration).

The parameter P-AXIS-00259 sets the acceleration value for the deceleration process with feedhold. The channel P-CHAN-00097 must be set to 1 to activate this function.

Example

Parameterising the axis parameters G200

Excerpt from the axis parameter list for G200 mode:

```
handbetrieb.hb.a_feedh        5000
handbetrieb.hb.tr             50000
handbetrieb.hb.tr_feedh       25000

handbetrieb.hb.vb_max          60000
handbetrieb.hb.a_max           1000
handbetrieb.hb.d_max           1000
handbetrieb.hb.a_max_red       500
```

2.6.2 Parameterising the axis parameters G201

G201: Manual mode with parallel path interpolation

When inclusive manual mode G201 {PROG] is activated, the dynamics of an axis is defined by a percentage split between interpolators for manual mode and for path mode.

The active ramp times for **manual mode** are defined by parameters P-AXIS-00359 and P-AXIS-00360 .

The active ramp times in **path mode** Are dependent on the active slope path profile and the parameters described in the section “Jerk-limited default acceleration profile [▸ 14]“.

The maximum permissible axis acceleration P-AXIS-00008results from the maximum value for aggregate acceleration resulting from manual and path modes. The parameter P-AXIS-00212 is considered as the maximum axis velocity.

The parameter P-AXIS-00082 sets the percentage acceleration component for manual mode.

The parameter P-AXIS-00094 sets the percentage acceleration component for path mode.

The parameter P-AXIS-00083 sets the percentage velocity component for manual mode.

The parameter P-AXIS-00095 sets the percentage velocity component for path mode.

Example

Parameterising the axis parameters G201

Excerpt from the axis parameter list for G201 mode:

```
handbetrieb.hb.tr 50000
handbetrieb.hb.tr_feedh 25000

handbetrieb.ipo.hb_proz_v_max 30
handbetrieb.ipo.hb_proz_a_max 30
handbetrieb.ipo.ipo_proz_v_max 70
handbetrieb.ipo.ipo_proz_a_max 70
```

2.6.3 Parameterising channel parameters

Manual mode when kinematic transformation is active

Additional Cartesian dynamic limits are available in conjunction with kinematic transformation, i.e. they act on Cartesian position axes and orientation axes.

Typical application examples are in the field of non-linear kinematics (e.g. robots) where the PCS limits (Cartesian programming coordinates) and ACS limits (axis coordinates) can have large differences.

Position axes: (typical axis index 0 to 2)

P-CHAN-00195: maximum velocity

P-CHAN-00196: maximum acceleration

P-CHAN-00197 Ramp time

Orientation axes: (typical axis index 3 to 5)

P-CHAN-00198: maximum velocity

P-CHAN-00199: maximum acceleration

P-CHAN-00200: Ramp time

Example

Manual mode when kinematic transformation is active

Excerpt from the channel parameter list:

```
#Position axes
man_mode.vector_limit.v_max_pos   15000
man_mode.vector_limit.a_max_pos   500
man_mode.vector_limit.tr_pos      10000

#orientation axes
man_mode.vector_limit.v_max_ori   15000
man_mode.vector_limit.a_max_ori   500
man_mode.vector_limit.tr_ori      10000
```

Notice

Due to the distance accuracy of the manual mode, the maximum permissible velocity in handwheel mode must be set to avoid unnecessarily long motion delay in handwheel mode. Therefore, the distance specified for each CNC cycle should not exceed the maximum velocity.

In the same way the incremental jog velocities must be aligned with the maximum permissible velocity in manual mode to avoid unnecessarily long motion delay after pressing the jog keys. With relatively small acceleration values, a certain delay time inevitably occurs after the jog key is released.

2.7 Parameters for homing

Parametrisation

The following parameters only are relevant for CNC-controlled homing.

In general, homing with digital intelligent drives is executed by the drive itself with drive-specific parameters.

When programming with G74 PROG the CNC uses the acceleration profile set using the P-AXIS-00270 parameter. The parameter P-AXIS-00285 is used as acceleration value; the parameter P-AXIS-00286 sets ramp time in conjunction with non-linear profiles.

Excerpt from the axis parameter list:

```
getriebe[0].slope_type     1
getriebe[0].a_ref          500
getriebe[0].tr_ref         200000
```

The linear profile is used without explicit parameterisation. The parameter a_ref is assigned the minimum of P-AXIS-00005 and P-AXIS-00006 .

The parameter P-AXIS-00218 sets slow velocity for cam and zero pulse search.

The parameter P-AXIS-00219 sets rapid velocity for cam and zero pulse search.

Excerpt from the axis parameter list:

```
getriebe[0].vb_refmax       20000
getriebe[0].vb_reflow       2000
```

2.8 Parameters for reduced velocity

Parametrisation

The following parameters are active when the user activates the real-time control signals in the PLC for

- reduced velocity or
- reduced velocity in the safety zone when the axis is in one of the two safety zones P-AXIS-00085, P-AXIS-00093 or P-AXIS-00097 and P-AXIS-00105.

This therefore limits the axis velocities travelled **and not the path velocity**to a predefined value.

The parameter P-AXIS-00214 defines the maximum velocity when the PLC signal is active:

gpAx[axis_idx]^.ipo_mc_control.**reduced_speed**

For rapid traverse motions, the parameter P-AXIS-00155 can set a deviating value. If the parameter P-AXIS-00155 is not assigned, the parameter P-AXIS-00214 is also used for rapid traverse motions.

The parameters P-AXIS-00030 and P-AXIS-00503 define the maximum permissible axis velocity in the safety zone when the PLC signal is active.

For zone 1 with associated reduced velocity:

gpAX[axis_idx]^.ipo_mc_control.**reduced_speed_zone**

or for zone 2 with associated reduced velocity:

gpAX[axis_idx]^.ipo_mc_control.**reduced_speed_2_zone**

Also define additional position limits for the zones.

Excerpt from the axis parameter list:

```
getriebe[0].vb_max_red        25000
getriebe[0].rapid_speed_red   50000
getriebe[0].vb_max_red_zone   50000
getriebe[0].vb_max_red_zone_2 50000
```

2.9 Control flags

Parametrisation

The parameter P-CHAN-00009 activates jerk limiting at tangential block transitions. A return takes place at tangential transitions between 2 circles of different radii or between a circle and a linear block, for instance.

Excerpt from the channel parameter list:

```
corr_v_trans_jerk      1
```

The parameter mentioned above is effective only in conjunction with the jerk-limited acceleration profile.

The parameter P-CHAN-00110 activates jerk limiting in polynomial blocks. Jerk monitoring is always active with circular blocks.

Polynomial blocks are generated in the CNC in conjunction with polynomial contouring, spline and HSC functions.

Excerpt from the channel parameter list:

```
check_jerk_on_poly_path  1
```

The parameter P-CHAN-00097 selects the CNC braking mode when feedhold is active. When the flag is set, the feedhold parameter block is used for the braking operation, i.e. braking is possible at a higher acceleration than when part machining or positioning is active.

Excerpt from the channel parameter list:

```
use_drive_curr_limit     1
```

Pay attention to the following for the jerk-limited acceleration profile in line with the descriptions:

An increase in deceleration values at constant jerk does not automatically lead to a shorter braking distance. With the jerk-limited profile, this also depends on the ramp time and the velocity decrease difference.

The borderline case is described in the section “Jerk-limited default acceleration profile“ [14] .

3 Parameterisation

3.1 Overview

3.1.1 Channel parameters

ID	Parameter	Description
P-CHAN-00001	acceleration	Effect of acceleration weighting
P-CHAN-00002	acceleration	Maximum path acceleration
P-CHAN-00009	corr_v_trans_jerk	Jerk limitation at a tangential block transition
P-CHAN-00056	max_vb_override	Maximum channel override
P-CHAN-00071	profile	Default acceleration profile
P-CHAN-00073	ramp_time	Effect of ramp time weighting
P-CHAN-00090	velocity	Maximum path velocity
P-CHAN-00097	use_drive_curr_limit	Deceleration response at feedhold
P-CHAN-00110	check_jerk_on_poly_path	Jerk limitation in polynomial
P-CHAN-00195	v_max_pos	Manual mode: Maximum Cartesian velocity
P-CHAN-00196	a_max_pos	Manual mode: Maximum Cartesian acceleration
P-CHAN-00197	tr_max_pos	Manual mode: Maximum Cartesian ramp time
P-CHAN-00198	v_max_ori	Manual mode: Maximum velocity of orientation axis
P-CHAN-00199	a_max_ori	Manual mode: Maximum velocity of orientation axis
P-CHAN-00200	tr_max_ori	Manual mode: Maximum ramp time of orientation axis
P-CHAN-00208	deceleration	Maximum path deceleration
P-CHAN-00351	acc_dec_unit	Unit of P-CHAN-00002, P-CHAN-00208

3.1.2 Axis parameters

General parameters

ID	Parameter	Description
P-AXIS-00003	a_emergency	Emergency axis acceleration
P-AXIS-00008	a_max	Maximum permissible axis acceleration
P-AXIS-00030	vb_max_red_zone	Reduced velocity in security zone
P-AXIS-00155	rapid_speed_red	Reduced velocity with G00
P-AXIS-00209	vb_eilgang	Rapid traverse velocity (G00)
P-AXIS-00212	vb_max	Maximum permissible axis velocity
P-AXIS-00214	vb_max_red	Reduced velocity with G01, G02 and G03
P-AXIS-00218	vb_reflow	Minimum velocity for cam and zero pulse search
P-AXIS-00219	vb_refmax	Maximum velocity for cam and zero pulse search
P-AXIS-00285	a_ref	Acceleration for CNC-controlled homing
P-AXIS-00503	vb_max_red_zone_2	Reduced velocity in safety zone 2

Parameters of stepped acceleration profile

ID	Parameter	Description
P-AXIS-00005	a_grenz_stufe_1	Rapid traverse step 1 acceleration (G00)
P-AXIS-00006	a_grenz_stufe_2	Acceleration in step 2 in rapid traverse (G00)
P-AXIS-00011	a_stufe_1	Acceleration in Step 1
P-AXIS-00012	a_stufe_2	Acceleration in Step 2
P-AXIS-00024	a_feedh	Feedhold acceleration
P-AXIS-00211	vb_grenz_stufe_1_2	Changeover velocity between rapid traverse acceleration stages (G00)
P-AXIS-00221	vb_stufe_1_2	Changeover velocity between acceleration stages

Parameters of jerk-limited acceleration profiles

ID	Parameter	Description
P-AXIS-00001	a_beschl	Acceleration at increasing velocity
P-AXIS-00002	a_brems	Acceleration at decreasing velocity
P-AXIS-00004	a_grenz	Acceleration in rapid traverse (G00)
P-AXIS-00013	a_trans_weight	Weighting of acceleration at motion block transition
P-AXIS-00053	a_feedh	Feedhold acceleration

ID	Parameter	Description
P-AXIS-00081	tr_feedh	Feedhold ramp time
P-AXIS-00154	r_trans_weight	Weighting of jerk at block transition
P-AXIS-00195	tr_beschl_ab	Ramp time for acceleration down-gradation
P-AXIS-00196	tr_beschl_zu	Ramp time for acceleration up-gradation
P-AXIS-00197	tr_brems_ab	Ramp time for deceleration down-gradation
P-AXIS-00198	tr_brems_zu	Ramp time for deceleration up-gradation
P-AXIS-00199	tr_geom	Geometric ramp time
P-AXIS-00200	tr_grenz	Ramp time in rapid traverse (G00)
P-AXIS-00201	tr_min	Minimum permissible ramp time
P-AXIS-00286	tr_ref	Ramp time during homing

Parameters for manual mode

ID	Parameter	Description
P-AXIS-00009	a_max	Maximum acceleration in manual mode (G200)
P-AXIS-00082	hb_proz_a_max	Percentage acceleration for manual mode (G201)
P-AXIS-00083	hb_proz_v_max	Percentage velocity for manual mode (G201)
P-AXIS-00094	ipo_proz_a_max	Percentage acceleration for path mode (G201)
P-AXIS-00095	ipo_proz_v_max	Percentage velocity for path mode (G201)
P-AXIS-00213	vb_max	Maximum velocity for manual mode (G200)
P-AXIS-00259	a_feedh	Feedhold acceleration in manual mode (G200)
P-AXIS-00359	tr	Ramp time in manual mode (G200)
P-AXIS-00360	tr_feedh	Feedhold ramp time in manual mode (G200)
P-AXIS-00541	d_max	Maximum deceleration in manual mode (G200)
P-AXIS-00545	a_max_red	Reduced maximum acceleration (G200)

3.2 Description

3.2.1 Channel parameters

P-CHAN-00001	**Default effect of acceleration weighting at program start**
Description	Default value to set acceleration weighting.
Parameter	prog_start.slope.acceleration
Data type	SGN16
Data range	0: Weighting acts on all accelerations (default) 1: Weighting acts on a_{accel} 2: Weighting acts on a_{decel}
Dimension	----
Default value	0
Remarks	

P-CHAN-00002	**Path acceleration limit**
Description	If no change is made to the parameter values by NC programming, this value limits path acceleration after it is activated in the NC program.
Parameter	vector.acceleration
Data type	REAL64
Data range	0 ... Maximum acceleration, application-specific
Dimension	mm/min² or mm/s² *
Default value	100000000
Remarks	* The dimension used depends on P-CHAN-00351 [▸ 52]. Parameterisation example: `vector.acceleration 1800000` The specified default value is in mm/min².

P-CHAN-00009	**Reduction of tangential transition velocity between circles**
Description	Tangential block transitions between circles with different radii and circles and linear blocks and vice versa lead to a jerk depending on circle radius. A jerk produced by activating this function can be reduced in order to reduce the excitation of vibrations on the machine when non-linear velocity profiles are active. At tangential block transitions, the speed is reduced dependent on the permissible jerk. The calculation is based on axis-specific jerk parameters for non-linear speed profiles (see also [AXIS] documentation). On the other hand, the reduction of speed at tangential block transitions is not acceptable with specific machining technologies since the machining process has a very sensitive reaction to a reduction in velocity.
Parameter	corr_v_trans_jerk
Data type	BOOLEAN
Data range	0: No inclusion of jerk at tangential block transitions. 1: Inclusion of jerk at tangential block transitions.
Dimension	----
Default value	0
Remarks	

P-CHAN-00056	**Limiting maximum channel override**
Description	This parameter limits the maximum override in the channel.
Parameter	max_vb_override
Data type	UNS16
Data range	0 ≤ max_vb_override ≤ 2000 (maximum value of channel override, application-specific)
Dimension	0.1%
Default value	1000
Remarks	Parameterisation example: The limit of the maximum channel override is 150%. *max_vb_override 1500*

P-CHAN-00071	**Default acceleration profile at program start**
Description	Default value for the selected acceleration profile type with path movements and oscillating axis movements.
Parameter	prog_start.slope.profile
Data type	SGN16
Data range	0: Step-shaped acceleration profile (default) 1: Trapezoidal acceleration profile 2: Sine-square acceleration profile 3: Trapezoidal HSC acceleration profile (across blocks)
Dimension	----
Default value	0
Remarks	The acceleration profile and the associated acceleration and ramp time weighting can be programmed in the NC program with the #SLOPE [TYPE..] command [PROG]. The maximum of the weighted ramp times P-AXIS-00195 is always effective with the trapezoidal HSC acceleration profile. P-AXIS-00198. For every independent axis, the acceleration profile can also be programmed specifically in the NC command with the key word SLOPE_TYPE [PROG].

P-CHAN-00073	**Default effect of ramp time weighting at program start**
Description	Default value for setting ramp time weighting. This value is only relevant for trapezoidal or sine-square acceleration profiles.
Parameter	prog_start.slope.ramp_time
Data type	SGN16
Data range	0: Weighting affects all ramp times (default) 1: Weighting acts on $T_{R,accel,inc}$ 2: Weighting acts on $T_{R,accel,red}$ 3: Weighting acts on $T_{R,decel,inc}$ 4: Weighting acts on $T_{R,decel,red}$
Dimension	----
Default value	0
Remarks	

P-CHAN-00078	**Resolution of rotary axes**
Description	This value represents the conversion factor between the path motions or the positions programmed in the NC program and the internal representation for position values with rotary axes.
Parameter	rund_aufloes
Data type	REAL64
Data range	0 < rund_aufloes < MAX(REAL64)
Dimension	----
Default value	10000
Remarks	Not to be confused with the resolution of the drive encoder P-AXIS-00234/P-AXIS-00235. As of CNC Build V2.11.2026.09 P-CHAN-00315 replaces the parameters lin_aufloes, rund_aufloes and spind_aufloes (P-CHAN-00034, P-CHAN-00035 and P-CHAN-00036). It is recommended to use only P-CHAN-00315 as of this CNC Build. Parameterisation example: All rotary axes are specified in the dimension 'Degree' [°] in the NC program. *rund_aufloes 10000*

P-CHAN-00090	**Path velocity limit**
Description	If no change is made to the parameter values by NC programming, this value limits path velocity after it is activated in the NC program.
Parameter	vector.velocity
Data type	REAL64
Data range	0 ... Maximum acceleration, application-specific
Dimension	mm/min
Default value	2000000000
Remarks	Parameterisation example: `vector.velocity 1500`

P-CHAN-00090	Path velocity limit
Description	If no change is made to the parameter values by NC programming, this value limits path velocity after it is activated in the NC program.
Parameter	vector.velocity
Data type	REAL64
Data range	0 ... Maximum acceleration, application-specific SLOPE_VB_MAX
Dimension	mm/min
Default value	0

Remarks	Parameterisation example:
	`vector.velocity 1500`
	`vector.acceleration 1800000`
	`vector.deceleration 2000000`

P-CHAN-00097	**Valid deceleration ramp at FEEDHOLD**
Description	This parameter defines the deceleration ramp used when FEEDHOLD is active.
Parameter	use_drive_curr_limit
Data type	BOOLEAN
Data range	0: When FEEDHOLD occurs, deceleration takes place using the currently valid deceleration rate. 1: With FEEDHOLD, the parameterised deceleration in P-AXIS-00024 and the ramp time set in P-AXIS-00081 are used for deceleration. If these two parameters are not set, deceleration takes place at the current deceleration value (P-AXIS-00053 [▶ 63]).
Dimension	----
Default value	0
Remarks	

P-CHAN-00110	**Including jerk in the polynomial**
Description	The curvature of the programmed contour (polynomial) results in an axis jerk. If the value is 1 or 3, this jerk is monitored together with the axis-specific dynamic parameters of the geometrical ramp time (P-AXIS-00199). In addition, an active kinematic compensation movement is included when value 3 is in the polynomial. If the value is 2, the ramp times P-AXIS-00195… P-AXIS-00198 are used for jerk monitoring. If a relatively small maximum jerk is specified in the axis, the velocity on the path is reduced accordingly. If this reduction is not wanted for technological reasons, these parameters suppress jerk monitoring in polynomials.
Parameter	check_jerk_on_poly_path
Data type	UNS32
Data range	0: No jerk limiting in the polynomial. 1: Jerk limiting in the polynomial based on P-AXIS-00199 (default). 2: Jerk limiting in the polynomial based on the maximum of P-AXIS-00195, P-AXIS-00196, P-AXIS-00197, P-AXIS-00198. 3: As for value 1 and in addition polynomials in combination with kinematic compensation movement.
Dimension	----
Default value	1
Remarks	

P-CHAN-00195	**Command speed of a linear axis in manual operation mode**
Description	This parameter defines the Cartesian dynamics of a manual mode axis for an X, Y, Z movement.
Parameter	man_mode.vector_limit.v_max_pos
Data type	UNS32
Data range	1 < v_max_pos < MAX(UNS32)
Dimension	µm/s or 0.001°/s
Default value	0
Remarks	Parameterisation example: *man_mode.vector_limit.v_max_pos 100000 [µm/s]*

P-CHAN-00196	**Command acceleration of a linear axis in manual operation mode**
Description	This parameter defines the Cartesian dynamics of a manual mode axis for an X, Y, Z movement.
Parameter	man_mode.vector_limit.a_max_pos
Data type	UNS32
Data range	1 < a_max_pos < MAX(UNS32)
Dimension	mm/s² or °/s²
Default value	0
Remarks	Parameterisation example: *man_mode.vector_limit.a_max_pos 1000 [mm/s²]*

P-CHAN-00197	**Ramp time of a linear axis in manual operation mode**
Description	This parameter defines the Cartesian dynamics of a manual mode axis for an X, Y, Z movement.
Parameter	man_mode.vector_limit.tr_pos
Data type	UNS32
Data range	1 < tr_pos < MAX(UNS32)
Dimension	µs
Default value	0
Remarks	Parameterisation example: *man_mode.vector_limit.tr_pos 100000 [µs]*

P-CHAN-00198	**Command speed of an orientation axis in manual mode**
Description	This parameter defines the Cartesian dynamics of a manual mode axis with an A, B, C movement.
Parameter	man_mode.vector_limit.v_max_ori
Data type	UNS32
Data range	1 < v_max_ori < MAX(UNS32)
Dimension	µm/s or 0.001°/s
Default value	0
Remarks	Parameterisation example: *man_mode.vector_limit.v_max_ori 50000 [µm/s]*

P-CHAN-00199	**Command acceleration of an orientation axis in manual mode**
Description	This parameter defines the Cartesian dynamics of a manual mode axis with an A, B, C movement.
Parameter	man_mode.vector_limit.a_max_ori
Data type	UNS32
Data range	1 < a_max_ori < MAX(UNS32)
Dimension	mm/s² or °/s²
Default value	0
Remarks	Parameterisation example: *man_mode.vector_limit.a_max_ori 500 [mm/s²]*

P-CHAN-00200	**Ramp time of an orientation axis in manual mode**
Description	This parameter defines the Cartesian dynamics of a manual mode axis with an A, B, C movement.
Parameter	man_mode.vector_limit.tr_ori
Data type	UNS32
Data range	1 < tr_ori < MAX(UNS32)
Dimension	µs
Default value	0
Remarks	Parameterisation example: *man_mode.vector_limit.tr_ori 100000 [µs]*

P-CHAN-00208	**Path deceleration limit**
Description	If no change is made to the parameter values by NC programming, this value limits path deceleration after it is activated in the NC program.
Parameter	vector.deceleration
Data type	REAL64
Data range	0 ... Maximum deceleration, application-specific
Dimension	mm/min² or mm/s² *
Default value	100000000
Remarks	* The dimension used depends on P-CHAN-00351 [▸ 52]. Parameterisation example: `vector.deceleration 2000000` The specified default value is in mm/min².

P-CHAN-00351	Unit for path acceleration and path deceleration
Description	This channel parameter switches over the unit of acceleration/deceleration in the #VECTOR LIMIT command. The default unit is mm/min² or mm/min³. This unit is switched over to mm/s² by setting the parameters to MM_S2. The arguments ACC, DEC, RADIAL_ACC and RADIAL_JERK in the NC command are then interpreted in the unit mm/s² or mm/s³.
Parameter	vector.acc_dec_unit
Data type	STRING
Data range	MM_M2: Unit is mm/min² or mm/min³ MM_S2: Unit is mm/sec² or mm/sec³
Dimension	----
Default value	MM_M2
Remarks	This parameter cannot be set using the NC command #VECTOR LIMIT. Parameterisation example: *vector.acc_dec_unit MM_S2*

3.2.2 Axis parameters

3.2.2.1 General parameters

P-AXIS-00003	Deceleration for an emergency stop	
Description	The parameter defines the used deceleration for an emergency stop. If errors of error reaction class 4 occur, the NC decelerates at the rate for specific axes. The path then leaves the trajectory.	
Parameter	getriebe[i].dynamik.a_emergency	
Data type	UNS32	
Data range	1 ≤ a_emergency ≤ 2*P-AXIS-00008	
Axis types	T, R, S	
Dimension	T: mm/s²	R,S: °/s²
Default value	0	
drive types.	----	
Remarks	When the parameter has the value 0, the value of P-AXIS-00008 (a_max) is used.	

P-AXIS-00008	**Maximum permissible axis acceleration**	
Description	The parameter defines the maximum permissible axis acceleration.	
Parameter	getriebe[i].dynamik.a_max	
Data type	UNS32	
Data range	1 ≤ a_max ≤ 100000000 (Presetting of maximum axis acceleration, plausibility limit, application-specific)	
Axis types	T, R, S	
Dimension	T: mm/s²	R,S: °/s²
Default value	1000	
Drive types	----	
Remarks		

P-AXIS-00030	**Maximum permissible axis velocity in security zone**	
Description	The parameter defines the maximum permissible axis velocity inside the security zones 1 and 2 if the control signal is active. Activation for security zone 1 is executed by the “Reduced velocity in zone 1“ control unit. This security zone is limited by the position limits given by P-AXIS-00093 and P-AXIS-00085. Activation for security zone 2 is executed by the “Reduced velocity in zone 2“ control unit. This security zone is limited by the position limits given by P-AXIS-00105 and P-AXIS-00097.	
Parameter	getriebe[i].vb_max_red_zone	
Data type	UNS32	
Data range	0 ≤ P.AXIS-00030 ≤ P-AXIS-00212	
Axis types	T, R	
Dimension	T: µm/s	R: 0.001°/s
Default value	0	
drive types.	----	
Remarks	When P-AXIS-00503 is 0 (default), this parameter is always effective for both zones.	

P-AXIS-00155	**Reduced maximum speed with active G00**	
Description	When G00 is active, the PLC can command the CNC by a control signal to switch over to a reduced axis feed. The control signal is sent by the “Reduced speed“ control unit. The reaction is in real time. After a deceleration which may be required, none of the moved axes moves faster than the parameter input.	
Parameter	getriebe[i].rapid_speed_red	
Data type	UNS32	
Data range	0 ≤ P-AXIS-00155 ≤ P-AXIS-00212	
Axis types	T, R, S	
Dimension	T: µm/s	R,S: 0.001°/s
Default value	0	
Drive types	----	
Remarks		

P-AXIS-00209	**Rapid mode velocity**	
Description	The rapid traverse velocity is specified for positioning in rapid traverse (G00).	
Parameter	getriebe[i].vb_eilgang	
Data type	UNS32	
Data range	1 ≤ vb_eilgang ≤ P-AXIS-00212	
Axis types	T, R, S	
Dimension	T: µm/s	R,S: 0.001°/s
Default value	166666	
Drive types	----	
Remarks		

P-AXIS-00212	**Maximum permissible axis velocity**	
Description	The parameter defines the maximum permissible axis velocity.	
Parameter	getriebe[i].dynamik.vb_max	
Data type	UNS32	
Data range	1 < hb_v_max_track ≤ 2000000000 (Presetting of maximum axis velocity, plausibility limit, application-specific)	
Axis types	T, R, S	
Dimension	T: µm/s	R,S: 0.001°/s
Default value	200000	
Drive types	----	
Remarks	In the case of axes of the type 'ACHSTYP_TRANSLATOR' and 'ACHSTYP_ROTATOR' it is presumed that while setting the maximum permissible axis velocity the resolution limits of the measuring system will also be taken into consideration. In the case of axes of the type 'ACHSTYP_SPINDEL' which are controlled by a spindle interpolator, the limit at which the measuring system delivers no valid values is set using the parameter P-AXIS-00220 . Example of an entry for a spindle speed of 10000 rpm: value = 10000 * 1000/6 = 1666666 (unit 0.001°/s)	

P-AXIS-00214	**Reduced maximum speed with active G01**	
Description	The PLC uses a control signal to command the CNC to switch over to a reduced axis feed. The control signal is sent by the “Reduced speed“ control unit. The reaction is in real time. After a deceleration which may be required, none of the moved axes moves faster than the parameter input. The active G01 deceleration value is used for the braking operation. If the deceleration value is changed in the NC program (#VECTOR LIMIT, G130, G131), it affects the braking operation. This parameter defines the reduced axis speed, even if manual mode is active.	
Parameter	getriebe[i].vb_max_red	
Data type	UNS32	
Data range	0 ≤ P-AXIS-00214 ≤ P-AXIS-00212	
Axis types	T, R, S	
Dimension	T: µm/s	R,S: 0.001°/s
Default value	0	
Drive types	----	
Remarks		

P-AXIS-00218	**Slow velocity for exact detection of reference position**	
Description	Not only the traverse downwards of cam but also the traverse on cam with homing takes place at the velocity P-AXIS-00218.	
Parameter	getriebe[i].vb_reflow	
Data type	UNS32	
Data range	1 ≤ vb_reflow ≤ P-AXIS-00219	
Axis types	T, R, S	
Dimension	T: µm/s	R,S: 0.001°/s
Default value	16666	
drive types.	Simulation, Conventional, Terminal, Lightbus, Profidrive	
Remarks		

P-AXIS-00219	**Fast velocity for detection of reference cam**	
Description	At start of homing, if the axis is not on the cam, then travel on the cam takes place at the velocity defined in P-AXIS-00219.	
Parameter	getriebe[i].vb_refmax	
Data type	UNS32	
Data range	P-AXIS-00218 ≤ vb_refmax ≤ P-AXIS-00212	
Axis types	T, R, S	
Dimension	T: µm/s	R,S: 0.001°/s
Default value	83333	
drive types.	Conventional, Terminal, Lightbus, Profidrive	
Remarks		

P-AXIS-00285	**Acceleration during homing**	
Description	The parameter includes the axis acceleration during CNC-controlled homing procedure. If the parameter is unassigned, the values of the parameters P-AXIS-00005, P-AXIS-00006are adopted.	
Parameter	getriebe[i].a_ref	
Data type	UNS32	
Data range	0 ≤ a_ref ≤ P-AXIS-00008	
Axis types	T, R	
Dimension	T: mm/s²	R: °/s²
Default value	0	
Drive types	Simulation, Conventional, Terminal, Lightbus, Profidrive	
Remarks	When the parameter has the value 0, it is assigned the minimum of the values of P-AXIS-00005 (a_grenz-stufe_1) and P-AXIS-00006 .	

P-AXIS-00503	**Maximum permissible axis velocity in security zone 2**	
Description	The parameter defines the maximum permissible axis velocity inside the security zones 1 and 2 if the control signal is active. Activation for security zone 2 is executed by the “Reduced velocity in zone 2“ control unit. This security zone is limited by the position limits given by P-AXIS-00105 and P-AXIS-00097.	
Parameter	getriebe[i].vb_max_red_zone_2	
Data type	UNS32	
Data range	0 ≤ P-AXIS-00503 ≤ P-AXIS-00212	
Axis types	T, R	
Dimension	T: µm/s	R: 0.001°/s
Default value	0	
Drive types	----	
Remarks	This parameter is available as of CNC Build V3.1.3052.05 or higher. When the parameter value is not set or has the value 0, vb_max_red_zone_2 is not active, i.e. the identical value of P-AXIS-00030.	

3.2.2.2 Linear slope

P-AXIS-00005	**Acceleration of step 1 in rapid mode (linear slope)**	
Description	The parameter defines the step 1 rapid traverse acceleration (G00). For positioning in rapid traverse (G00), ramps are often chosen steeper than for the linear and circular interpolation (G01, G02, G03).	
Parameter	getriebe[i].lslope_profil.a_grenz_stufe_1	
Data type	UNS32	
Data range	1 ≤ a_grenz_stufe_1 ≤ P-AXIS-00008	
Axis types	T, R, S	
Dimension	T: mm/s²	R,S: °/s²
Default value	1000	
Drive types	----	
Remarks	This limit acceleration is generally set close to the current limit to achieve fast positioning and fast deceleration values. The acceleration ramps can be changed in the NC program. The appropriate NC commands are described in [PROG//G231] in greater detail.	

P-AXIS-00006	**Acceleration of step 2 in rapid mode (linear slope)**	
Description	The parameter defines the step 2 rapid traverse acceleration (G00). For positioning in rapid traverse (G00), ramps are often chosen steeper than for the linear and circular interpolation (G01, G02, G03).	
Parameter	getriebe[i].lslope_profil.a_grenz_stufe_2	
Data type	UNS32	
Data range	1 ≤ a_grenz_stufe_2 ≤ P-AXIS-00008	
Axis types	T, R, S	
Dimension	T: mm/s²	R,S: °/s²
Default value	1000	
Drive types	----	
Remarks	This limit acceleration is generally set close to the current limit to achieve fast positioning and fast deceleration values. The acceleration ramps can be changed in the NC program. The appropriate NC commands are described in [PROG//G231] in greater detail.	

P-AXIS-00011	**Acceleration of step 1 (linear slope)**	
Description	The parameter only becomes active during the deceleration phases. It defines the acceleration in step 1.	
Parameter	getriebe[i].lslope_profil.a_stufe_1	
Data type	UNS32	
Data range	1 ≤ a_stufe_1 ≤ P-AXIS-00008	
Axis types	T, R, S	
Dimension	T: mm/s²	R,S: °/s²
Default value	1000	
Drive types	----	
Remarks	The acceleration ramps can be changed in the NC program. The appropriate NC commands are described in detail in [PROG//G130, G131] in greater detail.	

P-AXIS-00012	**Acceleration of step 2 (linear slope)**	
Description	The parameter only becomes active during the deceleration phases. It defines the acceleration in step 2.	
Parameter	getriebe[i].lslope_profil.a_stufe_2	
Data type	UNS32	
Data range	1 ≤ a_stufe_2 ≤ P-AXIS-00008	
Axis types	T, R, S	
Dimension	T: mm/s²	R,S: °/s²
Default value	1000	
Drive types	----	
Remarks	The acceleration ramps can be changed in the NC program. The appropriate NC commands are described in detail in [PROG//G130, G131] in greater detail.	

P-AXIS-00024	**Deceleration for feedhold (linear slope)**	
Description	When feedhold is active because of user reaction, measurement travel or homing, steeper ramps are often required than for positioning (G00) or workpiece machining (e.g. G01, G02, G03). The parameter defines the deceleration value for these cases. When the feed stop (e_feedhold) control unit is used, the value of this parameter is always used. If the entry is missing or assigned the value 0, the minimum of the values of P-AXIS-00005 (a_grenz_stufe_1 and P-AXIS-00006 (a_grenz_stufe_2) is used for deceleration.	
Parameter	getriebe[i].lslope_profil.a_feedh	
Data type	UNS32	
Data range	0 ≤ a_feedh ≤ P-AXIS-00008	
Axis types	T, R	
Dimension	T: mm/s²	R: °/s²
Default value	0	
Drive types	----	
Remarks	P-AXIS-00024 is only used with feedhold if the parameter P-CHAN-00097 in the channel parameter list is assigned the value 1. If P-AXIS-00024 is assigned the value 0, the minimum of the values P-AXIS-00005 (a_grenz_stufe_1 and P-AXIS-00006 (a_grenz_stufe_2) is used.	

P-AXIS-00211	**Changeover speed in rapid mode (linear slope)**	
Description	For positioning in rapid traverse (G00), ramps are often chosen steeper than for the linear and circular interpolation (G01, G02, G03). The parameter defines the acceleration and deceleration phases for these cases. It defines the changeover speed between step 1 and step 2 (P-AXIS-00005 and P-AXIS-00006 orP-AXIS-00281 and P-AXIS-00280).	
Parameter	getriebe[i].lslope_profil.vb_grenz_stufe_1_2	
Data type	UNS32	
Data range	1 ≤ vb_grenz_stufe_1_2 ≤ P-AXIS-00212	
Axis types	T, R, S	
Dimension	T: µm/s	R,S: 0.001°/s
Default value	100000	
Drive types	----	
Remarks		

P-AXIS-00221	Changeover speed (linear slope)	
Description	The parameter becomes active during the acceleration and deceleration phases. It defines the changeover speed between step 1 and step 2 (P-AXIS-00011 and P-AXIS-00012 or P-AXIS-00283 and P-AXIS-00282).	
Parameter	getriebe[i].lslope_profil.vb_stufe_1_2	
Data type	UNS32	
Data range	1 ≤ vb_stufe_1_2 ≤ P-AXIS-00212	
Axis types	T, R, S	
Dimension	T: µm/s	R,S: 0.001°/s
Default value	100000	
Drive types	----	
Remarks		

3.2.2.3 Non-linear slope

P-AXIS-00001	Acceleration at machining feed (non-linear slope)	
Description	The parameter represents the axis acceleration with increasing velocity.	
Parameter	getriebe[i].slope_profil.a_beschl	
Data type	UNS32	
Data range	1 ≤ a_beschl ≤ P-AXIS-00008	
Axis types	T, R	
Dimension	T: mm/s²	R,S: °/s²
Default value	1000	
Drive types	----	
Remarks	The acceleration ramps can be changed in the NC program. The appropriate NC commands are described in [PROG//G130/G131] in greater detail.	

P-AXIS-00002	**Deceleration at machining feed (non-linear slope)**	
Description	The parameter represents the axis deceleration with decreasing velocity.	
Parameter	getriebe[i].slope_profil.a_brems	
Data type	UNS32	
Data range	1 ≤ a_brems ≤ P-AXIS-00008	
Axis types	T, R, S	
Dimension	T: mm/s²	R,S: °/s²
Default value	1000	
Drive types	----	
Remarks	The acceleration ramps can be changed in the NC program. The appropriate NC commands are described in [PROG//G130/G131] in greater detail.	

P-AXIS-00004	**Acceleration at rapid movement (non-linear slope)**	
Description	This acceleration parameter is active for deceleration and acceleration with rapid traverse movements (G00).	
Parameter	getriebe[i].slope_profil.a_grenz	
Data type	UNS32	
Data range	1 ≤ a_grenz ≤ P-AXIS-00008	
Axis types	T, R, S	
Dimension	T: mm/s²	R,S: °/s²
Default value	1000	
Drive types	----	
Remarks	The acceleration ramps can be changed in the NC program. The appropriate NC commands are described in [PROG//G231] in greater detail.	

P-AXIS-00013	**Weighting of acceleration at motion block transition**	
Description	This parameter weights the permissible acceleration at a motion block transition. If the value 0 is not specified in the parameter list, the weighting of the permissible acceleration with the cycle time/ramp time factor is valid (default setting).	
Parameter	getriebe[i].dynamik.a_trans_weight	
Data type	UNS32	
Data range	1 ≤ a_trans_weight ≤ 1000	
Axis types	T, R, S	
Dimension	T: 0.1%	R,S: 0.1%
Default value	0	
drive types.	----	
Remarks	This parameter is only considered if the non-linear slope is used as soon as the contour has a kink angle.	

P-AXIS-00053	**Deceleration at feedhold (non-linear slope)**	
Description	When feedhold is active because of user reaction, measurement travel or homing, ramps are often chosen steeper than for positioning (G00) or workpiece machining (e.g. G01, G02, G03). The parameter defines the deceleration value for these cases. If an entry is not made, the same deceleration as for G00 is used (P-AXIS-00005, P-AXIS-00006 or P-AXIS-00280, P-AXIS-00281).	
Parameter	getriebe[i].slope_profil.a_feedh	
Data type	UNS32	
Data range	1 ≤ a_feedh ≤ P-AXIS-00008	
Axis types	T, R	
Dimension	T: mm/s²	R: °/s²
Default value	0	
Drive types	----	
Remarks	P-AXIS-00053 is only used if parameter P-CHAN-00097 in the channel parameter list is assigned the value 1. When the parameter has the value 0, it is assigned the value of P-AXIS-00004 (a_grenz).	

P-AXIS-00081	**Ramp time at feedhold (non-linear slope)**	
Description	When feedhold is active, ramps are often chosen steeper than for positioning and for workpiece machining (e.g. G01, G02, G03). The parameter defines the ramp time value for these cases. If the entry is missing, acceleration is set up and cancelled using the rapid motion ramp time (P-AXIS-00005, P-AXIS-00006 or P-AXIS-00280, P-AXIS-00281).	
Parameter	getriebe[i].slope_profil.tr_feedh	
Data type	UNS32	
Data range	P-AXIS-00201 ≤ tr_feedh ≤ MAX(UNS32)	
Axis types	T, R	
Dimension	T: µs	R: µs
Default value	0	
Drive types	----	
Remarks	P-AXIS-00081 is only used if parameter P-CHAN-00097 in the channel parameter list is assigned the value 1. When the parameter has the value 0, it is assigned the value of P-AXIS-00200 (tr_grenz).	

P-AXIS-00154	**Weighting of jerk at block transition**	
Description	At the block transition from linear to circular block or vice versa, a jump in acceleration occurs, even if there is a tangential transition. The parameter weights the permissible jerk at these types of movement transitions. Jerk is only considered if P-CHAN-00009 [▸ 45] is set. If P-AXIS-00154 is not set in the parameter list, the velocity is reduced to such an extent that the permissible jerk at the block transition is maintained.	
Parameter	getriebe[i].dynamik.r_trans_weight	
Data type	UNS32	
Data range	0 ≤ r_trans_weight ≤ 1000	
Axis types	T, R, S	
Dimension	T: 0.1%	R,S: 0.1%
Default value	1000	
drive types.	----	
Remarks	This parameter is only considered if the non-linear slope is used and for circular - linear, circular - circular or linear - circular transitions.	

P-AXIS-00195	**Ramp time for acceleration down-gradation (non-linear slope)**	
Description	The parameter defines the acceleration ramp time for the down-gradation of acceleration P-AXIS-00001.	
Parameter	getriebe[i].slope_profil.tr_beschl_ab	
Data type	UNS32	
Data range	P-AXIS-00201 ≤ tr_beschl_ab ≤ MAX(UNS32)	
Axis types	T, R, S	
Dimension	T: µs	R,S: µs
Default value	50000	
drive types.	----	
Remarks	The ramp time can be changed in the NC program. The appropriate NC commands are described in [PROG//Ramp time weighting (G132/G133/G134/G233/G338/G339)] in greater detail.	

P-AXIS-00196	**Ramp time for acceleration up-gradation (non-linear slope)**	
Description	The parameter defines the acceleration ramp time for the up-gradation of the acceleration P-AXIS-00001.	
Parameter	getriebe[i].slope_profil.tr_beschl_zu	
Data type	UNS32	
Data range	P-AXIS-00201 ≤ tr_beschl_zu ≤ MAX(UNS32)	
Axis types	T, R, S	
Dimension	T: µs	R,S: µs
Default value	50000	
drive types.	----	
Remarks	The ramp time can be changed in the NC program. The appropriate NC commands are described in [PROG//Ramp time weighting (G132/G133/G134/G233/G338/G339)] in greater detail. The default value for ramp time weighting can be defined in P-CHAN-00073 [▸ 46].	

P-AXIS-00197	**Ramp time for deceleration down-gradation (non-linear slope)**	
Description	The parameter defines the acceleration ramp time for the down-gradation of deceleration P-AXIS-00002.	
Parameter	getriebe[i].slope_profil.tr_brems_ab	
Data type	UNS32	
Data range	P-AXIS-00201 ≤ tr_brems_ab ≤ MAX(UNS32)	
Axis types	T, R, S	
Dimension	T: µs	R,S: µs
Default value	50000	
drive types.	----	
Remarks	The ramp time can be changed in the NC program. The appropriate NC commands are described in [PROG//Ramp time weighting (G132/G133/G134/G233/G338/G339)] in greater detail.	

P-AXIS-00198	**Ramp time for deceleration up-gradation (non-linear slope)**	
Description	The parameter defines the acceleration ramp time for the up-gradation of deceleration P-AXIS-00002.	
Parameter	getriebe[i].slope_profil.tr_brems_zu	
Data type	UNS32	
Data range	P-AXIS-00201 ≤ tr_brems_zu ≤ MAX(UNS32)	
Axis types	T, R, S	
Dimension	T: µs	R,S: µs
Default value	50000	
drive types.	----	
Remarks	The ramp time can be changed in the NC program. The appropriate NC commands are described in [PROG//Ramp time weighting (G132/G133/G134/G233/G338/G339)] in greater detail.	

P-AXIS-00199	**Geometric ramp time**	
Description	The parameter defines the permissible geometric ramp time. This parameter limits axis jerk caused by the programmed contour.	
Parameter	getriebe[i].dynamik.tr_geom	
Data type	UNS32	
Data range	0 (Preset of minimum ramp time, application-specific) ≤ tr_geom ≤ MAX(UNS32)	
Axis types	T, R, S	
Dimension	T: µs	R,S: µs
Default value	10000	
drive types.	----	
Remarks	The ramp time can be changed in the NC program. The appropriate NC commands are described in [PROG//Ramp time weighting (G132/G133/G134/G233/G338/G339)] in greater detail.	

P-AXIS-00200	**Ramp time at rapid movement (non-linear slope)**	
Description	This ramp time parameter is active at programmed rapid traverse (G00) for acceleration and deceleration. In this case, it replaces the 2 ramp times for acceleration (P-AXIS-00195, P-AXIS-00196) or the 2 ramp times for deceleration (P-AXIS-00197, P-AXIS-00198).	
Parameter	getriebe[i].slope_profil.tr_grenz	
Data type	UNS32	
Data range	P-AXIS-00201 ≤ tr_grenz ≤ MAX(UNS32)	
Axis types	T, R, S	
Dimension	T: µs	R,S: µs
Default value	10000	
Drive types	----	
Remarks	The ramp time can be changed in the NC program. The appropriate NC commands are described in [PROG//G233] in greater detail.	

P-AXIS-00201	Minimum permissible ramp time	
Description	The parameter defines the minimum permissible ramp time of the drive. This parameter limits the axis jerk arising due to velocity profile.	
Parameter	getriebe[i].dynamik.tr_min	
Data type	UNS32	
Data range	0 (Preset of minimum ramp time, application-specific) ≤ tr_min ≤ MAX(UNS32)	
Axis types	T, R, S	
Dimension	T: µs	R,S: µs
Default value	10000	
Drive types	----	
Remarks		

P-AXIS-00286	Ramp time during homing	
Description	The parameter includes the ramp time during CNC-controlled homing and active non-linear slope profile (see P-AXIS-00270). If the parameter is 0 or too small, the value of P-AXIS-00201(tr_min) is adopted.	
Parameter	getriebe[i].tr_ref	
Data type	UNS32	
Data range	P-AXIS-00201 ≤ tr_ref ≤ MAX(UNS32)	
Axis types	T, R	
Dimension	T: µs	R: µs
Default value	0	
Drive types	Simulation, Conventional, Terminal, Lightbus, Profidrive	
Remarks	If the parameter is assigned the value 0, the value in P-AXIS-00201(tr_min) is adopted.	

3.2.2.4 Parameters for manual mode

P-AXIS-00009	Maximum acceleration for manual operation without parallel interpolation	
Description	The parameter defines the maximum acceleration for manual operation mode.	
Parameter	handbetrieb.hb.a_max	
Data type	UNS32	
Data range	0 ≤ a_max ≤ P-AXIS-00008	
Axis types	T, R	
Dimension	T: mm/s²	R: °/s²
Default value	1000	
Drive types	----	
Remarks		

P-AXIS-00082	**Acceleration part of manual operation with parallel interpolation**	
Description	The parameter defines the acceleration part of manual operation mode at the permissible axis acceleration.	
Parameter	handbetrieb.ipo.hb_proz_a_max	
Data type	UNS16	
Data range	0 … 100	
Axis types	T, R	
Dimension	T: %	R: %
Default value	30	
Drive types	----	
Remarks		

P-AXIS-00083	**Velocity part of manual operation with parallel interpolation**	
Description	The parameter defines the velocity part of manual operation mode at the permissible axis velocity.	
Parameter	handbetrieb.ipo.hb_proz_v_max	
Data type	UNS16	
Data range	0 … 100	
Axis types	T, R	
Dimension	T: %	R: %
Default value	30	
Drive types	----	
Remarks		

P-AXIS-00094	**Acceleration part of interpolation**	
Description	The parameter defines the acceleration part of interpolation at permissible axis acceleration.	
Parameter	handbetrieb.ipo.ipo_proz_a_max	
Data type	UNS16	
Data range	0 … 100	
Axis types	T, R	
Dimension	T: %	R: %
Default value	70	
Drive types	----	
Remarks	P-AXIS-00082 (hb_proz_a_max) and P-AXIS-00094 (ipo_proz_a_max) together must be 100%.	

P-AXIS-00095	**Velocity part of interpolation**	
Description	The parameter defines the velocity part of interpolation at the permissible axis velocity.	
Parameter	handbetrieb.ipo.ipo_proz_v_max	
Data type	UNS16	
Data range	0 … 100	
Axis types	T, R	
Dimension	T: %	R: %
Default value	70	
Drive types	----	
Remarks	P-AXIS-00083 (hb_proz_v_max) and P-AXIS-00095 (ipo_proz_v_max) together must be 100%.	

P-AXIS-00213	**Maximum velocity for manual operation without parallel interpolation**	
Description	The parameter defines the maximum velocity for manual operation mode.	
Parameter	handbetrieb.hb.vb_max	
Data type	UNS32	
Data range	0 < vb_max ≤ P-AXIS-00212	
Axis types	T, R	
Dimension	T: µm/s	R: 0,001°/s
Default value	166666	
Drive types	----	
Remarks		

P-AXIS-00259	**Feedhold acceleration for manual operation without parallel interpolation**	
Description	The parameter defines the acceleration with active feedhold for manual operation mode. When the parameter has the value 0, it is assigned the value of P-AXIS-00009 (handbetrieb.hb.a_max).	
Parameter	handbetrieb.hb.a_feedh	
Data type	UNS32	
Data range	0 ≤ a_feedh ≤ P-AXIS-00008	
Axis types	T, R	
Dimension	T: mm/s²	R: °/s²
Default value	0	
Drive types	----	
Remarks		

P-AXIS-00359	**Ramp time during maximum acceleration for manual operation without parallel interpolation**	
Description	The parameter defines the ramp time in basic mode for manual operation mode. Value 0 means linear slope (default).	
Parameter	handbetrieb.hb.tr	
Data type	UNS32	
Data range	P-AXIS-00201 ≤ tr ≤ MAX(UNS32)	
Axis types	T, R	
Dimension	T: µs	R: µs
Default value	0	
Drive types	----	
Remarks		

P-AXIS-00360	**Ramp time at feedhold for manual operation without parallel interpolation**	
Description	The parameter defines the ramp time during active feedhold for manual operation mode.	
Parameter	handbetrieb.hb.tr_feedh	
Data type	UNS32	
Data range	P-AXIS-00201 [▸ 68] ≤ tr_feedh ≤ MAX(UNS32)	
Axis types	T, R	
Dimension	T: µs	R: µs
Default value	0	
Drive types	----	
Remarks	P-AXIS-00259 is output and P-AXIS-00360 is only used if parameter P-CHAN-00097 in the channel parameter list is assigned the value 1.	

P-AXIS-00541	**Maximum delay for manual operation without parallel interpolation**	
Description	The parameter defines the maximum delay for manual operation mode. When the parameter has the value 0, it is assigned the value of P-AXIS-00009 (handbetrieb.hb.a_max).	
Parameter	handbetrieb.hb.d_max	
Data type	UNS32	
Data range	0 < d_max ≤ P-AXIS-00008	
Axis types	T, R	
Dimension	T: mm/s²	R: °/s²
Default value	0	
Drive types	----	
Remarks		

P-AXIS-00545	**Reduced maximum acceleration for manual operation without parallel interpolation**	
Description	The parameter defines the active acceleration for manual mode with an active PLC control signal via the control unit Activation of reduced manual mode acceleration (bahn_mc_control.reduced_acceleration).	
Parameter	handbetrieb.hb.a_max_red	
Data type	UNS32	
Data range	0 < a_max_red ≤ P-AXIS-00008	
Axis types	T, R	
Dimension	T: mm/s²	R: °/s²
Default value	1000	
drive types.	----	
Remarks		

3.3 Channel list example

Excerpt from the channel parameter list

Units: Acceleration in [mm/min^2], velocity in [mm/min], weighting values in per mil

```
slope.profile                                  0
slope.ramp_time                                0
slope.acceleration                             0

max_vb_override                             1000

check_jerk_on_poly_path                        0
corr_v_trans_jerk                              0
use_drive_curr_limit                           1

vector.acceleration                      1800000
vector.velocity                             1500
```

3.4 Axis list example

Excerpt from the axis parameter list

Units: Acceleration in [mm/s² or °/s2], velocity in [µm/s or 1E-3 °/s], ramp time in [µs], weighting values in per mil.

General limits:

```
getriebe[0].dynamik.vb_max                              1000000
getriebe[0].dynamik.a_max                               6000
getriebe[i].dynamik.a_emergency.......................6000

getriebe[0].vb_eilgang                                  1000000
getriebe[0].vb_max_red                                  40000
getriebe[0].rapid_speed_red                             40000
getriebe[0].vb_max_red_zone                             20000

getriebe[0].vb_reflow                                   10000
getriebe[0].vb_refmax                                   150000
getriebe[0].a_ref                                       1000
```

Trapezoidal/sine-square acceleration profile

```
getriebe[0].slope_profil.a_beschl                       1000
getriebe[0].slope_profil.a_brems                        1000
getriebe[0].slope_profil.tr_beschl_zu                   50000
getriebe[0].slope_profil.tr_beschl_ab                   50000
getriebe[0].slope_profil.tr_brems_zu                    50000
getriebe[0].slope_profil.tr_brems_ab                    50000
getriebe[0].slope_profil.a_grenz                        2500
getriebe[0].slope_profil.tr_grenz                       10000
getriebe[0].slope_profil.a_feedh                        6000
getriebe[0].slope_profil.tr_feedh                       10000

getriebe[0].dynamik.tr_min                              5000
getriebe[0].dynamik.tr_geom                             5000
getriebe[0].dynamik.a_trans_weight                      0
getriebe[0].dynamik.r_trans_weight                      0
getriebe[0].tr_ref                                      100000
```

Step-shaped acceleration profile

```
getriebe[0].lslope_profil.a_stufe_1                     1000
getriebe[0].lslope_profil.a_stufe_2                     1000
getriebe[0].lslope_profil.vb_stufe_1_2                  1000000
getriebe[0].lslope_profil.a_grenz_stufe_1               5000
getriebe[0].lslope_profil.a_grenz_stufe_2               5000
getriebe[0].lslope_profil.vb_grenz_stufe_1_2            1000000
getriebe[0].lslope_profil.a_feedh                       1500
```

Keyword index

P

4 Appendix

4.1 Suggestions, corrections and the latest documentation

Did you find any errors? Do you have any suggestions or constructive criticism? Then please contact us at documentation@isg-stuttgart.de. The latest documentation is posted in our Online Help (DE/EN):

QR code link: https://www.isg-stuttgart.de/documentation-kernel/

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E-Mail: documentation@isg-stuttgart.de

www.isg-stuttgart.de
support@isg-stuttgart.de