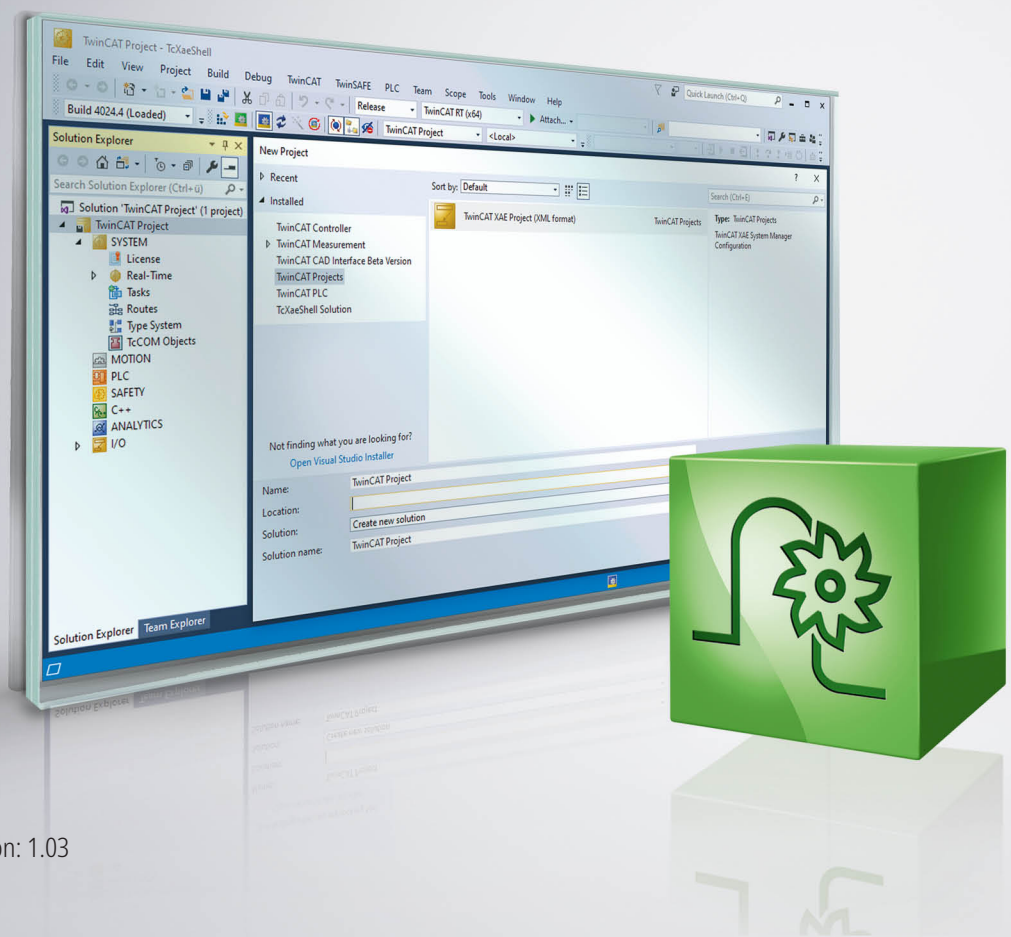
BECKHOFF New Automation Technology

Manual | EN

TF5200 | TwinCAT 3 CNC

Start-up list



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Notes on the documentation

This description is only intended for the use of trained specialists in control and automation engineering who are familiar with the applicable national standards.
It is essential that the documentation and the following notes and explanations are followed when installing and commissioning the components.
It is the duty of the technical personnel to use the documentation published at the respective time of each installation and commissioning.

The responsible staff must ensure that the application or use of the products described satisfy all the requirements for safety, including all the relevant laws, regulations, guidelines and standards.

Disclaimer

The documentation has been prepared with care. The products described are, however, constantly under development.
We reserve the right to revise and change the documentation at any time and without prior announcement.
No claims for the modification of products that have already been supplied may be made on the basis of the data, diagrams and descriptions in this documentation.

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Patent Pending

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EP1590927, EP1789857, EP1456722, EP2137893, DE102015105702
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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

1. 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.

NOTE

Restriction or error

This icon describes restrictions or warns of errors.

Tips and other notes

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

General example

Example that clarifies the text.

NC programming example

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

Specific version information

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

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1 Description of elements

The TwinCAT System Manager enters or changes a variety of parameters automatically. A manual change is overwritten when the configuration is activated.

Parameters that are automatically changed are marked accordingly.

1.1 Number of configured channels (P-STUP-00001)

P-STUP-00001	Number of configured channels
Description	Application-specific definition of the number of NC channels. The number specified in this parameter must correspond to the configured channels. This parameter informs the systems sequence controller of the number of NC channels. This topology description compiled in binary lists must correspond to this data item.
Parameter	kanal_anzahl
Data type	SGN16
Data range	1 - 12
Dimension	----
Default value	0
Remarks	This parameter ist used automatically in TwinCAT systems

1.2 SERCOS start-up (P-STUP-00002)

P-STUP-00002	SERCOS start-up
Description	This parameter defines whether SERCOS drives should also be run up at start-up.
Parameter	sercos_hochlauf
Data type	SGN16
Data range	0 or .1
Dimension	----
Default value	0
Remarks	A SERCOS card must be installed. TwinCAT: SERCOS parameter without effect

1.3 Number of SERCOS rings (P-STUP-00003)

P-STUP-00003	Number of SERCOS rings
Description	This parameter defines the number of SERCOS rings in the system.
Parameter	sercos_ring_anzahl
Data type	UNS16
Data range	0 or .1
Dimension	----
Default value	0
Remarks	

1.4 SERCOS baud rate (P-STUP-00004)

P-STUP-00004	SERCOS baud rate
Description	This parameter defines the baud rate for the SERCOS driver.

Parameter	serc_baudrate[i][j] where i = 0 (maximum number of SERCOS rings: 1, application-specific) j = 0 .... 29 (maximum length of external filenames: 30, application-specific)
Data type	STRING
Data range	2MBAUD / 4MBAUD
Dimension	----
Default value	-
Remarks	

1.5 SERCOS time slot calculation (P-STUP-00005)

P-STUP-00005	**SERCOS time slot calculation**
Description	Option to select a SERCOS time slot calculation mode.
Parameter	mds_time_slots
Data type	SGN16
Data range	0: internal calculation 1: Adopting predefined values from axis / device lists
Dimension	----
Default value	0
Remarks	

1.6 SERCOS AT time slot calculation (P-STUP-00006)

P-STUP-00006	**SERCOS AT time slot calculation**
Description	Option to select an AT time slot calculation mode.
Parameter	at_tslot_type
Data type	STRING
Data range	DEFAULT / OPTION1
Dimension	----
Default value	DEFAULT:
Remarks	

1.7 SERCOS Master transmit power (P-STUP-00031)

P-STUP-00031	**SERCOS Master transmit power**
Description	This parameter adjusts the light intensity of the SERCOS master hardware transmitter diode. A reduction in transmit power can, for example, prevent a receiver diode overload in the downstream SERCOS ring user.
Parameter	optical_intensity
Data type	UNS16
Data range	1 ... 6
Dimension	----
Default value	6
Remarks	

1.8 Topology selected (P-STUP-00007)

P-STUP-00007	**Topology selected**

Description	This parameter is used to select a topology description (configuration) for the NC kernel. The selected configuration must be contained in the code in the form of a binary file.
Parameter	konfiguration
Data type	STRING
Data range	EIN_KANAL_KONFIGURIERUNG / ... / ACHT_KANAL_KONFIGURIERUNG
Dimension	----
Default value	-
Remarks	This parameter ist used automatically in TwinCAT systems

1.9 List type (P-STUP-00008)

P-STUP-00008	**List type**
Description	This parameter is used to define whether start-up is performed using binary lists or ASCII lists.
Parameter	listen
Data type	STRING
Data range	ASCII / BINAER
Dimension	----
Default value	ASCII
Remarks	TwinCAT: Entry may not be changed.

1.10 List file name for channel parameters (P-STUP-00009)

P-STUP-00009	**List file name for channel parameters**
Description	This parameter defines for each channel the name of the file containing channel parameters.
Parameter	sda_mds[i] where i = 0 ... 11 (maximum number of channels: 12, application-specific)
Data type	STRING
Data range	Maximum 256 characters (application-specific)
Dimension	----
Default value	-
Remarks	This parameter ist used automatically in TwinCAT systems

1.10.1 List file name for default channel parameters (P-STUP-00034)

P-STUP-00034	**List file name for default channel parameters**
Description	This parameter is used cross-channel to define the name of the file containing channel parameters assigned with default values.
Parameter	default_sda_mds
Data type	STRING
Data range	Maximum 256 characters (application-specific)
Dimension	----
Default value	-
Remarks	This parameter ist used automatically in TwinCAT systems

1.11 Name of the tool data list file (P-STUP-00010)

P-STUP-00010	Name of the tool data list file
Description	This parameter defines for each channel the name of the file containing tool data.
Parameter	werkz_data[i] where i = 0 ... 11 (maximum number of channels: 12, application-specific)
Data type	STRING
Data range	Maximum 256 characters (application-specific)
Dimension	----
Default value	-
Remarks	This parameter ist used automatically in TwinCAT systems

1.12 Name of the list file for zero point data (P-STUP-00011)

P-STUP-00011	Name of the list file for zero point data
Description	This parameter defines for each channel the name of the file containing zero point data.
Parameter	nullp_data[i] where i = 0 ... 11 (maximum number of channels: 12, application-specific)
Data type	STRING
Data range	Maximum 256 characters (application-specific)
Dimension	----
Default value	-
Remarks	This parameter ist used automatically in TwinCAT systems

1.13 Name of the list files for clamp position offset data (P-STUP-00012)

P-STUP-00012	Name of the list files for clamp position offset data
Description	This parameter defines for each channel the name of the file containing clamp position offset data.
Parameter	pzv_data[i] where i = 0 ... 11 (maximum number of channels: 12, application-specific)
Data type	STRING
Data range	Maximum 256 characters (application-specific)
Dimension	----
Default value	-
Remarks	This parameter ist used automatically in TwinCAT systems

1.14 Name of the list file for manual mode parameters (P-STUP-00013)

P-STUP-00013	Name of the list file for manual mode parameters
Description	This parameter is used cross-channel to define the name of the file containing manual mode parameters.
Parameter	hand_mds
Data type	STRING
Data range	Maximum 256 characters (application-specific)
Dimension	----

Default value	-
Remarks	This parameter ist used automatically in TwinCAT systems

1.15 Number of axis machine data records (P-STUP-00014)

P-STUP-00014	Number of axis machine data records
Description	This parameter determines the number of axis data records that are to be interpreted and this defines the number of axes in the system.
Parameter	zahl_mds
Data type	SGN16
Data range	1 ... 32
Dimension	----
Default value	0
Remarks	This parameter ist used automatically in TwinCAT systems

1.16 Name of the list file for axis parameters (P-STUP-00015)

P-STUP-00015	Name of the list file for axis parameters
Description	This parameter is used cross-channel to define the names of axis parameter data files. The number of axis parameter data files must correspond to the number of axis parameter data records. If more files are specified than are contained in P-STUP-00014 [▶ 12] (zahl_mds), the excess files are not considered. Vice versa, if the system attempts to open unknown files, error messages are output and controller start-up is aborted.
Parameter	achs_mds[i] where i = 0 ... 31 (maximum number of axes in the system: 32, application-specific)
Data type	STRING
Data range	Maximum 256 characters (application-specific)
Dimension	----
Default value	-
Remarks	This parameter ist used automatically in TwinCAT systems

1.16.1 Name of the list file for default axis parameters (P-STUP-00035)

P-STUP-00035	Name of the list file for default axis parameters
Description	This parameter is used cross-channel to define the name of the file containing the axis parameters assigned with default values.
Parameter	default_achs_mds
Data type	STRING
Data range	Maximum 256 characters (application-specific)
Dimension	----
Default value	-
Remarks	This parameter ist used automatically in TwinCAT systems

1.17 Number of offset value lists (P-STUP-00016)

P-STUP-00016	Number of offset value lists
Description	This parameter determines the number of offset value lists to be interpreted. The number of offset value lists may not be greater than the number of axes. An offset value list may exist for each axis.
Parameter	zahl_kw
Data type	SGN16
Data range	1 ... 32
Dimension	----
Default value	0
Remarks	This parameter ist used automatically in TwinCAT systems

1.18 Name of the list files for offset values (P-STUP-00017)

P-STUP-00017	Name of the list files for offset values
Description	This parameter is used cross-channel to define the names of offset value files. The number of offset value lists must correspond to the number of list files. If more files are specified than are contained in P-STUP-00016 [▶ 13] (zahl_kw), the excess files are not considered. Vice versa, if the system attempts to open unknown files, error messages are output and controller start-up is aborted.
Parameter	achs_kw[i] where i = 0 ... 31 (maximum number of axes in the system: 32, application-specific)
Data type	STRING
Data range	Maximum 256 characters (application-specific)
Dimension	----
Default value	-
Remarks	This parameter ist used automatically in TwinCAT systems

1.18.1 Axis assignment of the offset value list (P-STUP-00036)

P-STUP-00036	Axis assignment of the offset value list
Description	The logical axis number is used cross-channel to define the assignment between axes and offset value lists.
Parameter	achs_kw_log_ax_nr[i] where i = 0 ... 31 (maximum number of axes in the system: 32, application-specific)
Data type	UNS16
Data range	1 ... MAX(UNS16)
Dimension	----
Default value	0
Remarks	This parameter ist used automatically in TwinCAT systems

1.19 NC program paths (path[i].*)

This structure element defines the paths to the NC programs for each channel. The path string, the logical path number, the path type and priority must be specified for each program path.

As of CNC Build V3.1.3025.05, program paths can also be defined in the channel parameters. In this case, the program paths are removed from the start-up parameters.

Further information on program paths in the channel: [CHAN//NC program paths (path[i].*)]

Structure name	Index
pfad[i]	i = 0 ... 11 (channel index, e.g. Channel 1 -> Index 0, maximum number of channels: 12, application-specific)

1.19.1 Path specification (P-STUP-00018)

P-STUP-00018	Path name
Description	This parameter defines the path to the NC programs. The CNC employs this path to open an NC program.
Parameter	pfad[i].prg[j] where j = 0 ... 11 (maximum number of program paths in the system: 12, application-specific)
Data type	STRING
Data range	Maximum 256 characters (application-specific)
Dimension	----
Default value	-
Remarks	

1.19.2 Logical path number (P-STUP-00019)

P-STUP-00019	Logical path number
Description	This parameter defines a logical path number for the program path. Logical path numbers must be unique within the system.
Parameter	pfad[i].log_nr[j] where j = 0 ... 11 (maximum number of program paths in the system: 12, application-specific)
Data type	UNS16
Data range	1 ... MAX(UNS16)
Dimension	----
Default value	0
Remarks	

1.19.3 Path type (P-STUP-00020)

P-STUP-00020	Path type
Description	This parameter defines the type of the program path bit-encoded. A path specification may also be used for several path types.
Parameter	pfad[i].typ[j] where j = 0 ... 11 (maximum number of program paths in the system: 12, application-specific)
Data type	UNS16

Data range	0x01 (main program path) 0x02 (subroutine path) 0x04 (path for #MSG SAVE) 0x08 (path for storing debug data *.dbg) Combinations: 0x03 (main prog.+ subroutine path) 0x05 (main prog. path + path for #MSG SAVE) 0x06 (subroutine path + path for #MSG SAVE) 0x07 (main prog. + subroutine path + path for #MSG SAVE) 0x0B (main prog. path + subroutine path + path for debug data) 0x0F (main prog. path + subroutine path + path for #MSG SAVE and debug data)
Dimension	----
Default value	0
Remarks	

1.19.4 Priority (P-STUP-00021)

P-STUP-00021	**Priority**
Description	This parameter defines the priority of the program path. Priority determines the sequence of the directories of the corresponding path types when a search is made for the NC program file. The highest priority level is '0'. If a priority is not specified for a given program path, the path is initialised with priority '0'. An error message is output if the same priority is specified for a program path of the same path type.
Parameter	pfad[i].prioritaet[j] where j = 0 ... 11 (maximum number of program paths in the system: 12, application-specific)
Data type	UNS16
Data range	0 ... MAX(UNS16)
Dimension	----
Default value	0
Remarks	When the path types 0x04 and 0x08 are set as actual program paths, the priorities must be continued based on the sub program paths.

1.20 HMI objects (hmi[i].*)

1.20.1 Name of the list file (P-STUP-00024)

P-STUP-00024	Name of the list file
Description	This parameter defines the cross-channel name of the HMI object list.
Parameter	hmi[i].objects
Data type	STRING
Data range	Maximum 256 characters (application-specific)
Dimension	----
Default value	-
Remarks	This parameter ist used automatically in TwinCAT systems

1.20.2 Mode of the list file (P-STUP-00025)

P-STUP-00025	Mode of the list file
Description	This parameter defines the mode for loading the HMI object list.
Parameter	hmi[i].mode
Data type	STRING
Data range	write: The existing list is only read in. write+: The list is first created, then read in. default: The internal default list is used. No lists are generated externally.
Dimension	----
Default value	-
Remarks	This parameter ist used automatically in TwinCAT systems

1.21 Parameters for the BF Channel (channel[i].*)

1.21.1 Mode of the list file (P-STUP-00027)

P-STUP-00027	Mode of the list file
Description	This parameter defines the mode for loading the BF Channel object list.
Parameter	channel[i].mode
Data type	STRING
Data range	write: The existing list is only read in. write+: The list is first created, then read in. default: The internal default list is used. No lists are generated externally.
Dimension	----
Default value	-
Remarks	This parameter ist used automatically in TwinCAT systems

1.21.2 Name of the list file (P-STUP-00026)

P-STUP-00026	Name of the list file
Description	This parameter defines the cross-channel name of the BF Channel object list.
Parameter	channel[i].objects
Data type	STRING
Data range	Maximum 256 characters (application-specific)
Dimension	----
Default value	-
Remarks	

1.22 Memory size for backward motion (P-STUP-00033)

P-STUP-00033	Memory size for backward motion
Description	This parameter defines the memory size in bytes used for backward motion on the path. During start-up, the NC checks whether the required minimum size is available. If this is not the case, a warning is output and the memory size is set to the required minimum value. If the size is set to 0, the “forward/ backward motion on the path” function is not available. The maximum size is only limited by the resources available on the PC.
Parameter	fb_storage_size[i] where i = 0 to 11 (maximum number of channels: 12, application-specific)
Data type	UNS32
Data range	0 ... MAX(UNS32)
Dimension	----
Default value	0
Remarks	

1.23 Memory size for external variables (P-STUP-00037)

P-STUP-00037	Memory size for external variables

Description	This parameter dimensions the memory area available for the external variables of each channel on the HLI. A separate memory area of this size is created for global external variables. The number defined here determines the number of 24-byte blocks of which each of these V.E. memory areas consists.
Parameter	ext_var_max
Data type	UNS16
Data range	0 ... MAX(UNS16)
Dimension	----
Default value	0
Remarks	This parameter ist used automatically in TwinCAT systems

1.24 Name of the list file for external variables (P-STUP-00146)

P-STUP-00146	**Name of the list file for external variables**
Description	This parameter defines for each channel the name of the file containing the external variables.
Parameter	ve_var[i] where i = 0 ... 11 (maximum number of channels: 12, application-specific)
Data type	STRING
Data range	Maximum 256 characters (application-specific)
Dimension	----
Default value	-
Remarks	This parameter ist used automatically in TwinCAT systems

1.25 Version identifier of visualisation data (P-STUP-00039)

P-STUP-00039	**Version identifier of visualisation data**
Description	The parameter changes the display data of the simulation (contour visualisation [FCT-C17]). Depending on the setting selected, more or less visualisation data is generated.
Parameter	contour_visu_ifc_version
Data type	UNS32
Data range	0: Default setting 1: Up to CNC Build V2.11.2018.07: In addition the current NC program name is transferred to the display data (version identifier 0). 2: Available as of CNC Build V2.11.2018.08 and higher: The velocity programmed in an NC block and the technology functions programmed in the block are transferred in addition to the display data of version identifier 1.
Dimension	----
Default value	0
Remarks	

1.26 Global or channel-specific output of display data (P-STUP-00040)

P-STUP-00040	**Global or channel-specific output of display data**
Description	This parameter defines whether visualisation data is written to a FIFO output for each channel or whether the visualisation data of all channels is written to a global FIFO output.

Parameter	single_protocol_fifo
Data type	BOOLEAN
Data range	0: Channel-specific output of visualisation data 1: Common output of visualisation data.
Dimension	----
Default value	0 *
Remarks	* 1 as of CNC Build V3.1.3038

1.27 Alignment of external variables (P-STUP-00145)

P-STUP-00145	**Alignment of external variables**
Description	This parameter defines the alignment of external variables in the CNC ([EXTV]). IMPORTANT: They must correspond to the alignment setting used in the PLC.
Parameter	ext_var_struct_member_alignment
Data type	UNS08
Data range	Permissible values for this parameter are: 0: The CNC automatically defines the alignment of variables depending on the target platform 1: 1-byte alignment (pragma pack) is used for external variables. No alignment bytes are added. 2: 2-byte alignment is used 4: The CNC uses 4-byte alignment 8: The CNC uses 8-byte alignment
Dimension	----
Default value	0
Remarks	This parameter is only available as of CNC Build V3.1.3019.00 and higher. IMPORTANT: The alignment setting defined here must correspond to the alignment setting used in the PLC. Otherwise, no or incorrect values can be transferred if there is shared access to external variables. This parameter may only be changed in consultation with the controller manufacturer.

The following difference exists for TwinCAT systems:

TwinCAT2 -> 1-byte alignment

TwinCAT3 -> 8-byte alignment

1.28 Parameters for camming

1.28.1 Name of the list file for cam tables (P-STUP-00130)

P-STUP-00130	**Name of the list file for cam tables**
Description	This parameter defines the name and path of the parameter file specifying the cam table file entries.
Parameter	cam_table_loader
Data type	STRING
Data range	Maximum 256 characters (application-specific)
Dimension	----
Default value	-

Remarks	

1.28.2 Size of cam table memory (P-STUP-00131)

P-STUP-00131	**Size of cam table memory**
Description	This parameter defines the size of the cam table memory in bytes.
Parameter	cam_table_storage_size
Data type	UNS32
Data range	0 ... MAX(UNS32)
Dimension	----
Default value	50000
Remarks	

1.29 Parameter to trace position and dynamic data

1.29.1 Enabling/disabling the trace function (P-STUP-00132)

P-STUP-00132	Enabling/disabling the trace function
Description	This parameter enables or disables the trace function of the NC kernel.
Parameter	trace_function
Data type	BOOLEAN
Data range	0/1
Dimension	----
Default value	0
Remarks	

1.29.2 Defining the ring buffer size (P-STUP-00133)

P-STUP-00133	Defining the ring buffer size
Description	This parameter defines the size of the ring buffer for the trace function. The size indicates the number of buffer locations.
Parameter	trace_buffer_size
Data type	UNS32
Data range	0 ... MAX(UNS32)
Dimension	----
Default value	20000
Remarks	

1.30 Parameterising scheduling (P-STUP-00134)

P-STUP-00134	Parameterising scheduling
Description	This parameter controls CNC scheduling. A distinction is made between 2 methods: **Method 1:** Control runs in the CNC for at least one axis. Scheduling executes the following sequence: - Read actual values - Calculate position lags - Write velocity command values **Method 2:** All axes are position-controlled. Scheduling automatically executes the following changed sequence: - Read actual values - Write position command values - Calculate position for next cycle
Parameter	scheduling_position_controller
Data type	STRING
Data range	DEFAULT: Depending on axis control, the CNC decides on which scheduling mode is selected (mode 1 or 2). OPT_CNC_POS_CONTROL: Control in CNC; scheduling acc. to mode 1. OPT_DRIVE_POS_CONTROL: Control in the drives; scheduling acc. to mode 2
Dimension	----

Default value	DEFAULT
Remarks	

1.31 Parameter for configuration (configuration.*)

1.31.1 Platform scaling

1.31.1.1 Position control (configuration.position_controller.*)

1.31.1.1.1 Maximum number of logged events (P-STUP-00042)

P-STUP-00042	Maximum number of entries in the history buffer
Description	The CNC offers the options of filing events in a history memory (logging entries). This parameter defines the maximum number of logged events. If there are more entries, the oldest one is overwritten.
Parameter	configuration.position_controller.log_entry_number
Data type	UNS32
Data range	0 ... MAX(UNS32)
Dimension	----
Default value	0
Remarks	

1.31.1.1.2 Defining the type of logged events (P-STUP-00043)

P-STUP-00043	Defining the type of logged events
Description	The CNC offers the options of filing events in a history memory (logging entries). The parameter permits the user-specific definition of CNC logging entries to be logged. Depending on troubleshooting or the analysis requirement, event logging can be filtered in order to reduce the number of entries to be logged or analysed right from the outset.
Parameter	configuration.position_controller.log_level
Data type	UNS32
Data range	0 ... MAX(UNS32)
Dimension	----
Default value	0
Remarks	

1.31.1.2 Axis management (configuration.axes_manager.*)

1.31.1.2.1 Maximum number of logged events (P-STUP-00091)

P-STUP-00091	Maximum number of entries in the history buffer
Description	The CNC offers the options of filing events in a history memory (logging entries). This parameter defines the maximum number of logged events. If there are more entries, the oldest one is overwritten.
Parameter	configuration.axes_manager.log_entry_number
Data type	UNS32
Data range	0 ... MAX(UNS32)
Dimension	----
Default value	0
Remarks	

1.31.1.2.2 Defining the type of logged events (P-STUP-00092)

P-STUP-00092	Defining the type of logged events
Description	The CNC offers the options of filing events in a history memory (logging entries). The parameter permits the user-specific definition of CNC logging entries to be logged. Depending on troubleshooting or the analysis requirement, event logging can be filtered in order to reduce the number of entries to be logged or analysed right from the outset.
Parameter	configuration.axes_manager.log_level
Data type	UNS32
Data range	0 ... MAX(UNS32)
Dimension	----
Default value	0
Remarks	

1.31.2 Channel scaling (configuration.channel[i].*)

This structure element defines the functions for decoding, path preparation and interpolation for each channel

Structure name	Index
configuration.channel[i]	i = 0 ... 11 (maximum number of channels: 12, application-specific)

1.31.2.1 Decoding (configuration.channel[i].decoder.*)

1.31.2.1.1 Defining the decoder functionalities (P-STUP-00050)

P-STUP-00050	Definition of decoder functionsr
Description	The parameter defines specific functionalities for decoding. This disables specific functions for testing or for performance reasons.
Parameter	configuration.channel[i].decoder.function
Data type	STRING
Data range	FCT_USE_CACHED_FILES: Enabling file caching FCT_VOL_COMP_COMPUTATION: Calculations for machine calibration -: No functionalities defined.
Dimension	----
Default value	-
Remarks	Parameterisation example: Caching of maximal 4 files of maximum 4096 bytes each. *configuration.channel[0].decoder.function FCT_USE_CACHED_FILES* *configuration.channel[0].decoder.max_cache_number 4* *configuration.channel[0].decoder.max_cache_size 4096*

1.31.2.1.2 Maximum number of possible cache files (P-STUP-00051)

P-STUP-00051	Maximum number of possible cache files
Description	This parameter permits the user-specific definition of the maximum number of files available in the NC program cache.
Parameter	configuration.channel[i].decoder.max_cache_number
Data type	UNS32
Data range	0 ... MAX(UNS32)
Dimension	----
Default value	0
Remarks	Parameterisation example: Caching of maximal 4 files of maximum 4096 bytes each. *configuration.channel[0].decoder.function FCT_USE_CACHED_FILES* *configuration.channel[0].decoder.max_cache_number 4* *configuration.channel[0].decoder.max_cache_size 4096*

1.31.2.1.3 Maximum size of a cache file (P-STUP-00052)

P-STUP-00052	Maximum size of a cache file
Description	This parameter permits the user-specific definition of the maximum size of an NC program cache.
Parameter	configuration.channel[i].decoder.max_cache_size

Data type	UNS32
Data range	0 ... MAX(UNS32)
Dimension	----
Default value	0
Remarks	Parameterisation example: Caching of maximal 4 files of maximum 4096 bytes each. *configuration.channel[0].decoder.function FCT_USE_CACHED_FILES* *configuration.channel[0].decoder.max_cache_number 4* *configuration.channel[0].decoder.max_cache_size 4096*

1.31.2.1.4 Maximum number of local subroutine definitions (P-STUP-00053)

P-STUP-00053	**Maximum number of local subroutine definitions**
Description	This parameter permits the user-specific definition of the maximum number of local subroutine definitions (%L ...) in an NC program.
Parameter	configuration.channel[i].decoder.max_local_subroutine_definitions
Data type	UNS32
Data range	0 ... MAX(UNS32)
Dimension	----
Default value	50
Remarks	Parameterisation example: *configuration.channel[0].decoder.max_local_subroutine_definitions 70*

1.31.2.1.5 Maximum number of logged events (P-STUP-00054)

P-STUP-00054	**Maximum number of entries in the history buffer**
Description	The CNC offers the options of filing events in a history memory (logging entries). This parameter defines the maximum number of logged events. If there are more entries, the oldest one is overwritten.
Parameter	configuration.channel[i].decoder.log_entry_number
Data type	UNS32
Data range	0 ... MAX(UNS32)
Dimension	----
Default value	0
Remarks	

1.31.2.1.6 Defining the type of logged events (P-STUP-00055)

P-STUP-00055	**Defining the type of logged events**
Description	The CNC offers the options of filing events in a history memory (logging entries). The parameter permits the user-specific definition of CNC logging entries to be logged. Depending on troubleshooting or the analysis requirement, event logging can be filtered in order to reduce the number of entries to be logged or analysed right from the outset.
Parameter	configuration.channel[i].decoder.log_level
Data type	UNS32
Data range	0 ... MAX(UNS32)
Dimension	----
Default value	0
Remarks	

1.31.2.1.7 Maximum V.I. user memory in bytes (P-STUP-00183)

P-STUP-00183	Maximum V.I. user memory in bytes
Description	This parameter defines the maximum memory size in bytes to be provided for V.I. variables at controller start-up.
Parameter	configuration.channel[0].decoder.vi_memory
Data type	UNS32
Data range	0 ... MAX(UNS32)
Dimension	----
Default value	0
Remarks	The number and maximum usable memory must be defined in order to use V.I. variables. Select the memory to accommodate all the single variables and arrays.

1.31.2.1.8 Maximum number of creatable V.I. variables (P-STUP-00184)

P-STUP-00184	Maximum number of creatable V.I. variables
Description	This parameter defines the maximum number of V.I. variables which can be created and used.
Parameter	configuration.channel[0].decoder.vi_maximal_var_count
Data type	UNS32
Data range	0 ... MAX(UNS32)
Dimension	----
Default value	0
Remarks	The number and maximum usable memory must be defined in order to use V.I. variables. Set the maximum number of variables so that all individual variables and all arrays each receive an entry. One array always counts as one entry.

1.31.2.1.9 Maximum number of measurement records for machine calibration (P-STUP-00185)

P-STUP-00185	Maximum number of measurement records for machine calibration
Description	This parameter defines the maximum number of measurement records during machine calibration using the ISG calibration cycles. This parameter is used internally by measurement cycles and should only be configured or changed in consultation with ISG.
Parameter	configuration.channel[i].decoder.max_vol_comp_measurement_records
Data type	UNS32
Data range	0 ... MAX(UNS32)
Dimension	----
Default value	0
Remarks	Parameterisation example: A maximum of 50 measurement records are logged. *configuration.channel[0].decoder.function FCT_VOL_COMP_COMPUTATION* *configuration.channel[0].decoder.max_vol_comp_measurement_records 50*

1.31.2.2 Tool radius compensation (configuration.channel[i].tool_radius_comp.*)

1.31.2.2.1 Defining the functionalities for tool radius compensation (P-STUP-00080)

P-STUP-00080	Definition of functionalities for tool radius compensation
Description	This parameter defines individual functionalities for tool radius compensation.
Parameter	configuration.channel[i].tool_radius_comp.function
Data type	STRING
Data range	MULTI_PATH: 2-path configuration and programming active -: No functionalities defined.
Dimension	----
Default value	-
Remarks	

1.31.2.2.2 Maximum number of logged events (P-STUP-00081)

P-STUP-00081	Maximum number of entries in the history buffer
Description	The CNC offers the options of filing events in a history memory (logging entries). This parameter defines the maximum number of logged events. If more entries occur than there is memory space, the oldest entry is overwritten..
Parameter	configuration.channel[i].tool_radius_comp.log_entry_number
Data type	UNS32
Data range	0 ... MAX(UNS32)
Dimension	----
Default value	0
Remarks	

1.31.2.2.3 Defining the type of logged events (P-STUP-00082)

P-STUP-00082	Defining the type of logged events
Description	The CNC offers the options of filing events in a history memory (logging entries). The parameter permits the user-specific definition of CNC logging entries to be logged. Depending on troubleshooting or the analysis requirement, event logging can be filtered in order to reduce the number of entries to be logged or analysed right from the outset.
Parameter	configuration.channel[i].tool_radius_comp.log_level
Data type	UNS32
Data range	0 ... MAX(UNS32)
Dimension	----
Default value	0
Remarks	

1.31.2.3 Path preparation (configuration.channel[i].path_preparation.*)

1.31.2.3.1 Defining the functionalities for path preparation (P-STUP-00060)

P-STUP-00060	**Defining functionalities for path preparation.**	
Description	This parameter defines the individual functionalities for path preparation. The individual functions can be enabled or disabled for testing or for performance reasons.	
Parameter	configuration.channel[i].path_preparation.function	
Data type	STRING	
Data range	FCT_DEFAULT	The functions FCT_FFM | FCT_PRESEGMENTATION | FCT_SPLINE | FCT_POLY | FCT_CAX | FCT_CAX_TRACK | FCT_SEGMENTATION are available.
	FCT_FFM	Free-form surface mode, #HSC [OPMODE 1 CONTERR 0.01], #HSC [OPMODE 2]
	FCT_PRESEGMENTATION	Linear pre-segmentation in HSC mode
	FCT_SPLINE	#HSC[], AKIMA, B-Spline, G150/G151
	FCT_POLY	#CONTOUR MODE[], G61, G261/G260
	FCT_CAX	C axis processing, i.e. the spindle is embedded in the NC channel.
	FCT_CAX_TRACK	#CAX TRACK, tracking an axis according to the contour angle
	FCT_SEGMENTATION	For dynamic segmentation of the path contour, e.g. if the curvature of a polynomial segment varies significantly.
	The following functions must also be enabled:	
	FCT_LIFT_UP	Automatic lifting/lowering of an axis (path-based coupling). Example: FCT_DEFAULT | FCT_LIFT_UP
	FCT_EMF	Edge machining (sharp angle contours). Example: FCT_DEFAULT | FCT_EMF
	FCT_EMF_POLY_OFF	Edge machining inactive with polynomials. Contrary to the setting with FCT_EMF, edge signal generation is masked when path polynomial generation is active in the channel. Polynomials are generated for smoothing G261 or when BSpline is active. The resulting geometry is then tangential. Example: FCT_DEFAULT | FCT_EMF_POLY_OFF
	FCT_SYNC	Optimised planning using #HSC[BSPLINE]. Example: FCT_DEFAULT | FCT_SYNC
	FCT_PRECON	Optimised planning using #HSC[BSPLINE]. Example: FCT_DEFAULT | FCT_PRECON
	FCT_LIFT_UP_TIME	Automatic lifting/lowering of an axis (time-based coupling). Example: FCT_DEFAULT | FCT_LIFT_UP_TIME
	FCT_PTP	Dynamically optimised smoothing of the complete contour. Example: FCT_DEFAULT | FCT_PTP
	FCT_M_PRE_OUTPUT	Pre-output of M/H functions (microwebs). Example: FCT_DEFAULT | FCT_M_PRE_OUTPUT
	FCT_SURFACE	HSC machining with Surface Optimiser Example: FCT_DEFAULT | FCT_SURFACE
	FCT_SEG_CHECK	Block segmentation in combination with path-controlled offset of M functions (dwell time), see P-STUP-00070 [▶ 35] Example: FCT_DEFAULT | FCT_SEG_CHECK
Dimension	----	
Default value	FCT_DEFAULT	

Remarks	

1.31.2.3.2 Maximum number of blocks considered for pre-output of M functions (P-STUP-00061)

P-STUP-00061	**Maximum number of blocks considered for pre-output of M functions**
Description	This parameter permits the configuration of the look-ahead range for the pre-output of M functions (see [FCT-C1]).
Parameter	configuration.channel[i].path_preparation.m_pre_output_lookahead
Data type	UNS32
Data range	0 … 1000
Dimension	----
Default value	10
Remarks	Without an explicit setting, the range is limited by default to 10 NC blocks. This number of blocks may be insufficient for a pre-output of the M function at the desired position if the motion blocks are too short or too many control commands are programmed without any motion. In this case, the M function is pre-output to the maximum known path position and a warning is output. **Parameterisation example:** *configuration.channel[0].path_preparation.function FCT_DEFAULT | FCT_M_PRE_OUTPUT* *configuration.channel[0].path_preparation.m_pre_output_lookahead* 15

Maximum number of blocks considered for pre-output of M functions

```
%microjoint4
N01 G00 G90 X0 Y0
N02 G01 F10000

N01 V.G.M_FCT[100].PRE_OUTP_PATH = 28.6 ; in mm
N20 G91 Y1
N21 Y1 ; -> planned M output at Y1.4 mm
N22 Y1
N23 Y1
…
N39 Y1
; -> real M output due to limitation of the number of blocks
N40 Y1
N41 Y1
N42 Y1
N43 Y1
N44 Y1
N45 Y1
N46 Y1
N47 Y1
N48 Y1
N49 Y1
N50 M100 M26
N99 M30
```

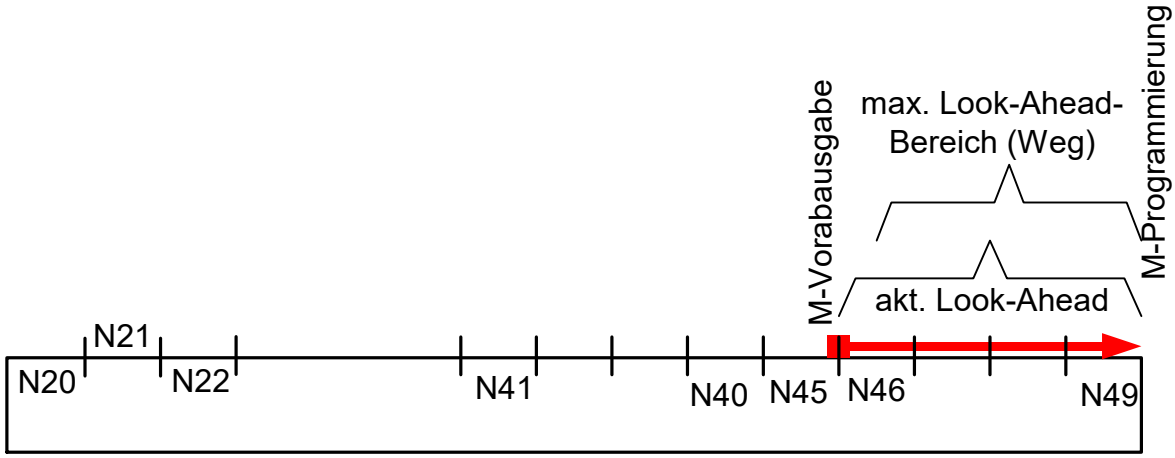

Figure 1: Limits the pre-output to the maximum look-ahead range (default 10 blocks).

The look-ahead range causes a delay at program start. As a result, only select the number of blocks that are absolutely necessary.

1.31.2.3.3 Maximum path for pre-output of M functions (P-STUP-00062)

P-STUP-00062	Maximum path for pre-output of M functions
Description	This parameter permits an additional limitation of the look-ahead range considered for the pre-output of M functions on a maximum path (see [FCT-C1]). If this maximum distance exceeds the sum of all currently considered motion blocks (except for the ‘oldest’ motion block), the ‘oldest’ motion block is output. In other words, an M function can be pre-output by at least the specified distance.
Parameter	configuration.channel[i].path_preparation.m_pre_output_max_distance
Data type	UNS32
Data range	0 ... MAX(UNS32)
Dimension	0.1µm
Default value	0

Remarks	If the maximum number of blocks P-STUP-00061 [▶ 30] is set to a high value, it may cause a long delay in channel reaction. To avoid this, a distance limit can also be specified. With long motion blocks in particular, this maximum distance is already reached after a few blocks. This prevents additional delay caused by saving motion blocks in the pre-output of M functions. Without an explicit setting, the range is not additional limited (only by the number of blocks P-STUP-00061 [▶ 30]). If a pre-output is set greater than the distance currently saved in the look-ahead range, the M function is pre-output at the maximum known path position and a warning is issued. **Parameterisation example:** *configuration.channel[0].path_preparation.function FCT_DEFAULT | FCT_M_PRE_OUTPUT* *configuration.channel[0].path_preparation.m_pre_output_lookahead 100* *configuration.channel[0].path_preparation.m_pre_output_max_distance 35000 [0.1µm]*

Maximum distance for pre-output of M functions

```
%microjoint62
N01 G00 G90 X0 Y0
N02 G01 F10000

'MOS' = '1'

N01 V.G.M_FCT[100].PRE_OUTP_PATH = 28.6 (* in mm *)
N02 V.G.M_FCT[100].SYNCH = 'MOS'

N20 G91 Y1
N21 Y1 ; -> MicroJoint at Y1.4 mm
…
N43 Y1
N44 Y1
N45 Y1
; Warning 120693: -> MicroJoint due to distance limitation 3.5mm
N46 Y1
N47 Y1
N48 Y1
N49 Y1
N50 M100
N99 M30
```

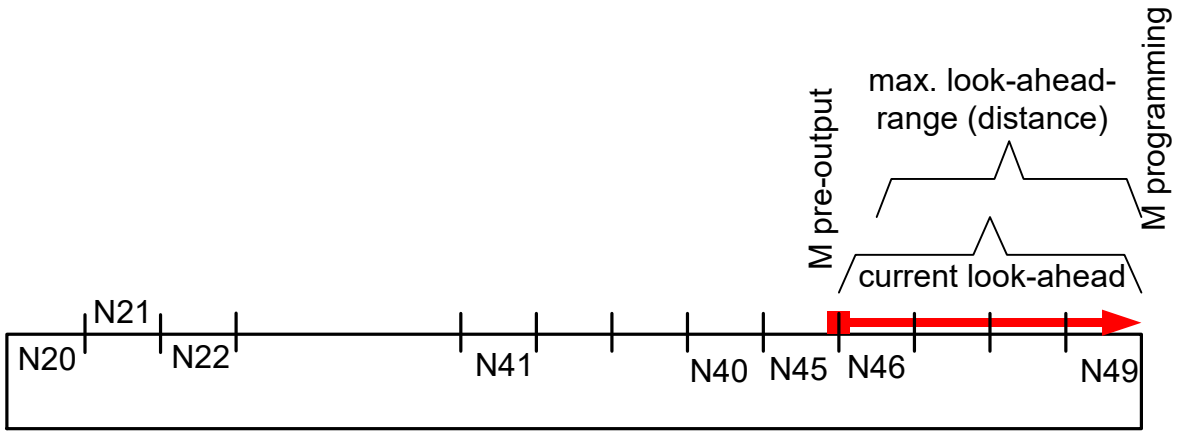

Figure 2: Distance-related limiting of pre-output to maximum look-ahead range.

1.31.2.3.4 Maximum number of logged events (P-STUP-00063)

P-STUP-00063	Maximum number of entries in the history buffer
Description	The CNC offers the options of filing events in a history memory (logging entries). This parameter defines the maximum number of logged events. If there are more entries, the oldest one is overwritten.
Parameter	configuration.channel[i].path_preparation.log_entry_number
Data type	UNS32
Data range	0 ... MAX(UNS32)
Dimension	----
Default value	0
Remarks	

1.31.2.3.5 Defining the type of logged events (P-STUP-00064)

P-STUP-00064	Defining the type of logged events

Description	The CNC offers the options of filing events in a history memory (logging entries). The parameter permits the user-specific definition of CNC logging entries to be logged. Depending on troubleshooting or the analysis requirement, event logging can be filtered in order to reduce the number of entries to be logged or analysed right from the outset.
Parameter	configuration.channel[i].path_preparation.log_level
Data type	UNS32
Data range	0 ... MAX(UNS32)
Dimension	----
Default value	0
Remarks	

1.31.2.4 Interpolation (configuration.channel[i].interpolator.*)

Settable functions for position control.

1.31.2.4.1 Defining interpolator functionalities (P-STUP-00070)

P-STUP-00070	**Definition of interpolator functionalities**	
Description	This parameter defines individual functionalities and the size of the look-ahead buffer in the interpolator, i.e. it defines the number of blocks to calculate deceleration distance and dynamic planning.	
Parameter	configuration.channel[i].interpolator.function	
Data type	STRING	
Data range	FCT_IPO_DEFAULT	FCT_LOOK_AHEAD_STANDARD
	FCT_LOOK_AHEAD_LOW	30 blocks
	FCT_LOOK_AHEAD_STANDARD	120 blocks
	FCT_LOOK_AHEAD_HIGH	190 blocks
	FCT_LOOK_AHEAD_CUSTOM	Any number of look-ahead blocks in the interval [0; 200]. Specification by parameter P-STUP-00071 [▶ 36].
	FCT_SYNC	Synchronisation of an axis on a path group. Example: FCT_IPO_DEFAULT | FCT_SYNC
	FCT_LOOK_AHEAD_OPT	The path velocity curve can be further improved for HSC machining by additional calculations. This generally reduces machining time. The additional calculations place greater demands on the controller hardware.
	FCT_LIFT_UP_TIME	Automatic lifting/lowering of an axis (time-based coupling). Example: FCT_IPO_DEFAULT | FCT_LIFT_UP_TIME
	FCT_SHIFT_NCBL	Path-controlled offset of M functions (dwell time). Example: FCT_IPO_DEFAULT | FCT_SHIFT_NCBL
	FCT_CALC_STATE_AT_T	Calculation of path velocity at a time in the future. Function only available in combination with HSC slope and only as of V3.1.3057.0 Example: FCT_IPO_DEFAULT | FCT_CALC_STATE_AT_T
	FCT_CALC_TIME	Calculation of interpolation time to next feed block (G01,G02,G03). Example: FCT_IPO_DEFAULT | FCT_CALC_TIME

Unit	----	
Default value	FCT_IPO_DEFAULT	
Remarks	The look-ahead buffer size specified above applies as of CNC Builds V2.11.2800 and higher. The following values apply as of CNC Build V2.11.20xx:	
	FCT_LOOK_AHEAD_LOW	30 blocks
	FCT_LOOK_AHEAD_STANDARD	70 blocks
	FCT_LOOK_AHEAD_HIGH	120 blocks

1.31.2.4.2 User-specific size of look-ahead buffer (P-STUP-00071)

P-STUP-00071	User-specific size of look-ahead buffer
Description	This parameter permits the user-defined definition of the number of NC blocks in the look-ahead buffer. The parameter is only evaluated if P-STUP-00070 [▶ 35] is set with FCT_LOOK_AHEAD_CUSTOM.
Parameter	configuration.channel[i].interpolator.number_blocks_lah *
Data type	UNS32
Data range	0 ... 200
Dimension	----
Default value	120
Remarks	As of Build V2.11.20 and higher, the default size of the look-ahead buffer is 70 blocks. As of Build V2.11.28 and higher, the default size is 120 blocks. As the size increases, the additional calculations make greater demands on the controller hardware. As of Build V3.1.3067.07 the upper limit of the data range is 500 blocks. If #SLOPE[TYPE=STEP] is used, the upper limit is 10000 blocks as of Build V3.1.3060.0. * P-STUP-00071 in V2.11.20 and higher : configuration.channel[i].interpolator.parameter

1.31.2.4.3 Maximum number of logged events (P-STUP-00072)

P-STUP-00072	Maximum number of entries in the history buffer
Description	The CNC offers the options of filing events in a history memory (logging entries). This parameter defines the maximum number of logged events. If more entries occur, the oldest entry is overwritten.
Parameter	configuration.channel[i].interpolator.log_entry_number
Data type	UNS32
Data range	0 ... MAX(UNS32)
Dimension	----
Default value	40
Remarks	

1.31.2.4.4 Defining the type of logged events (P-STUP-00073)

P-STUP-00073	Defining the type of logged events
Description	The CNC offers the options of filing events in a history memory (logging entries). The parameter permits the user-specific definition of the CNC logging entries to be logged. Depending on troubleshooting or the analysis requirement, event logging can be filtered in order to reduce the number of entries to be logged or analysed right from the outset.
Parameter	configuration.channel[i].interpolator.log_level
Data type	UNS32
Data range	0 ... MAX(UNS32)
Dimension	----
Default value	0
Remarks	

1.31.2.4.5 Number of logs of the dynamic coordinate system (P-STUP-00074)

P-STUP-00074	Number of logged input and output values of the dynamic CS
Description	When the dynamic coordinate system is calculated, the input and output values and the current dynCS can also be logged for diagnostic purposes. Logged data is loaded from the controller when diagnostic data is uploaded and written to a file.
Parameter	configuration.channel[i].interpolator.dyn_cs_history_max
Data type	UNS32
Data range	0 ... MAX(UNS32)
Dimension	----
Default value	20
Remarks	

1.31.2.4.6 Reducing interpolator computing time (P-STUP-00075)

P-STUP-00075	Definition of interpolator functionalities
Description	The mircroprocessor load can be limited by specifying the number of blocks per cycle considered in the look ahead process. Calculating the look ahead profile is then split into partial calculations over several cycles. **Example:** number_blocks_lah = 10000, blocks_per_call = 1000 The look ahead profile is then calculated split over 10 cycles. One disadvantage of this is the acceptance of real-time influences delayed by this time, e.g. an override change. Therefore, do not select a value that is too low.
Parameter	configuration.channel[i].interpolator.blocks_per_call
Data type	UNS32
Data range	1 ... The value is defined by P-STUP-00070 [▶ 35] .
Unit	----
Default value	200
Remarks	Parameter available as of V2.11.2033

1.31.3 General scaling

1.31.3.1 Logging entries of the CNC

The CNC offers the possibility of storing events in a history memory. If requested, these entries can be read out. When diagnostic data is requested, the entries are stored in a file, for example. Recording of events is currently possible in the following CNC architecture models:

- Decoder
- Path preparation
- Tool radius compensation
- Interpolation
- Axis driver (position control)
- Axis management

The controller manufacturer must already have planned for recording of individual CNC events.

Set the parameter **log_entry_number** to define the maximum number of logged events. If more entries occur, the oldest entry is overwritten.

Set the parameter **log_level** to permit the user-specific definition of the CNC logging entries to be logged. Depending on troubleshooting or the requirement for an analysis, recording of events can be filtered to already reduce the number of entries to be recorded/analysed from the outset.

Example parameters

```
configuration.channel[0].decoder.log_level 0x1010102f
configuration.channel[0].decoder.log_entry_number 256

configuration.channel[0].tool_radius_comp.log_entry_number 128
configuration.channel[0].path_preparation.log_entry_number 64

configuration.channel[0].interpolator.log_entry_number 150

configuration.position_controller.log_entry_number 32
configuration.position_controller.log_level 0x10ff20ff

configuration.axes_manager.log_entry_number 20
configuration.axes_manager.log_level 0x000000ff
```

Output example

```
PATH LOGGING CHANNEL NO.: 1
=========================================================================
BF 8 logging : 13/150, level ffffffff, index 13

time level  message
-------------------------------------------------------------------------
200852 00020000 1) UPLOAD-ind: start size=748
200856 00020000 1) UPLOAD-ind: data received, pos 0 + 748
200856 00020000 1) UPLOAD-ind: finished : position 748, cb lize
272901 00000001 BAHN restart... start
272904 00000001 BAHN restart...finished
279541 00000001 BAHN abort...start
279551 00000001 BAHN abort...finished
…
280622 00000001 BAHN restart...finished

BAVO LOGGING CHANNEL NO.: 1
=========================================================================
BF 11 logging : 10/64, level ffffffff, index 10

time level  message
-------------------------------------------------------------------------
200851 00020000 1) UPLOAD-req: start size=748, cb=ize, name=
200855 00020000 1) UPLOAD-req: start ackn : size=748
200855 00020000 1) UPLOAD-req: sent data : 0+748
200859 00020000 1) UPLOAD-req: sent data ackn, fini : 0+748=748
272899 00000001 BAVO reset start
…
280641 00000001 BAVO reset finished (no axes returned to AXV)

DECODER LOGGING CHANNEL NO.: 1
=========================================================================
BF 10 logging : 0/0, level 1010102f, index 0

time level  message
-------------------------------------------------------------------------

LR LOGGING CHANNEL NO.: 1
=========================================================================
BF 5 logging : 22/32, level 10ff20ff, index 22

time level  message
-------------------------------------------------------------------------
272907 00000001 lr_abort_axis() ok: axis=6
272907 00000001 lr_abort_axis() ok: axis=11
…
279600 00000001 lr_abort_axis() ok: axis=4
-------------------------------------------------------------------------
279600 00000001 lr_abort_axis() ok: axis=5
… 280620 00000001 lr_abort_axis() ok: axis=5
```

1.31.3.2 CNC logging events

1.31.3.2.1 Defining logging levels

Bit 31 to Bit 16 for cross-BF log level classes	Description
0x00010000 BF_LOG_STD	Default BF events
0x00020000 BF_LOG_UPLOAD	#COLL/SCENE RESTORE
0x40000000 BF_LOG_HIGH	High priority events
0x80000000 BF_LOG_RESET	Events at BF reset
0xFFFFffff BF_LOG_ALL	All BF log entries are logged.

Bit 15 to Bit 0 for BF-specific log level classes	Description
0x00000001 BAHN_LOG_STD	Default Interpolator
0x00000002 BAHN_LOG_DDTG_	Events at “Delete distance to go”

0x00000004 BAHN_LOG_FBC_	Forward/backward motion
0x00000008 BAHN_LOG_BS_	Block search

0x00000001 BAVO_LOG_STD	Default Bavo

0x00000001 DEC_LOG_STD	Default decoder
0x00000002 DEC_LOG_EXAMPLE_	---
0x00000004 DEC_LOG_VI	Interchannel variables

0x00000001 AXV_LOG_STD	Default axis exchange

0x00000001 LR_LOG_STD	Default position controller
0x00000002 LR_LOG_ALNK	Axis link from IPO to LR during channel output
0x00000004 LR_LOG_BODE_PLOT	Bode plot logging

1.32 Parameters for Volumetric Compensation (vol_comp[i].*)

For every controller, up to five records of compensation settings can be configured. Configuration of more than only one compensation makes sense on multi-channel machines, for example.

Structure name	Index
vol_comp[i]	i = 0 ... 5

1.32.1 Number of records to be read in (P-STUP-00100)

P-STUP-00100	Number of records to be read in
Description	This parameter specifies an upper limit for the number of parameter data records to be read in. It serves to allocate memory during controller start-up. An error is issued if this number is exceeded while reading in the records.
Parameter	vol_comp[i].max_records
Data type	SGN32
Data range	0 … MAX(SGN32)
Dimension	----
Default value	0
Remarks	

1.32.2 Configuration file for Volumetric Compensation (P-STUP-00101)

P-STUP-00101	Configuration file for Volumetric Compensation
Description	The path specified in this parameter refers to a list file which contains the main ith configuration of the volumetric compensation 'i'.
Parameter	vol_comp[i].file_name
Data type	STRING
Data range	<Path to the configuration file>
Dimension	----
Default value	-
Remarks	Parameterisation example: The row vol_comp[0].file_name C:\volcomp\vol_comp_0.lis defines the path to the configuration file.

1.33 User-specific data (customer.*)

1.33.1 Free values (P-STUP-00120)

P-STUP-00120	Free values
Description	The user can enter any values in this array. The values are not displayed in the controller, only on the HLI in the element gpPform^.nc_config.**customer_val_r[ ]** (see [HLI]). This permits the user to transfer configuration data to the PLC or HMI.
Parameter	customer.val[i] where i = 0 (maximum number of free values 1, application-specific)
Data type	UNS32
Data range	0 … MAX(UNS32)
Dimension	----
Default value	0
Remarks	

1.34 32-bit compatibility mode for CNC display data (P-STUP-00175)

P-STUP-00175	32-bit compatibility mode for CNC display data
Description	As of CNC Build 2807 and CNC Build 3039.06 and higher, the CNC position controller uses 64-bit integer variables with a finer resolution for command and actual positions. To ensure downward compatibility, this data is downscaled for display data in CNC objects and continue to be supplied as 32-bit values. Conversion can be deactivated by setting the ads_32_bit_comp_mode parameter to the value 0. High-resolution position controller variables are then transferred via CNC objects as 64-bit integer values.
Parameter	ads_32_bit_comp_mode
Data type	BOOLEAN
Data range	0: No conversion; high-resolution 64-bit variable. 1: Downward compatibility, conversion and supply of 32-bit integer variables
Dimension	----
Default value	1
Remarks	This parameter is available as of CNC Builds 2.11.2027.01 and V3.1.3039.06 or higher.

1.35 Parameters for error message output

1.35.1 Logging mode (P-STUP-00167)

P-STUP-00167	Logging mode
Description	Logging mode of the error output
Parameter	error_protocol_mode
Data type	STRING
Data range	FILTER_OFF No filters are evaluated VERBOSE Extended internal diagnostics WITHOUT_ERROR_MANAGER direct output without ErrorManager PRINT Execute output as print LOG Log output to log file REPORT Application-specific error output SEND_TO_PLC_NONE Suppress output to the PLC PRINT_EXTENDED Extended print output LOG_EXTENDED Extended log output REPORT_EXTENDED Extended application-specific output PRINT_NO_WARNINGS Warnings are suppressed in the print output LOG_NO_WARNINGS Warnings are suppressed in the log output REPORT_NO_WARNINGS Warnings are suppressed in the report output SEND_TO_PLC_NO_WARNINGS Suppress warnings to PLC STARTUP_NO_WARNINGS Suppress warnings during controller start-up NO_WARNINGS Suppress all warnings
Dimension	----
Default value	-
Remarks	

1.35.2 Name of text file containing error message texts (P-STUP-00168)

P-STUP-00168	**Name of the file for error message texts**
Description	Name of the file containing the error message texts which belong to the ID (error number). These can be used for output to the log file. This file is used to assign an error number to the related error message text. The file contains one line in the following format for each error ID: <Error-ID> TABULATOR <Error-Text> The default file 'err_text_version_eng.txt' is assumed if no file is specified.
Parameter	error_text_of_id
Data type	STRING
Data range	Maximum 256 characters
Dimension	----
Default value	-
Remarks	

1.35.3 Name of text file containing user-specific error message texts (P-STUP-00169)

P-STUP-00169	Name of the file for user-specific error message texts
Description	Comparable to default error texts (see P-STUP-00168 [▶ 43]), you can also specify user-specific texts in this file. These texts are used for error IDs in the range [1;1000] and for McCOM interface errors. This file is used to assign an error number to the related user-specific error message text. (ERR_KIN_TRAFO_CONFIG/-INITIALIZE/-FORWARD/-BACKWARD = 292030-292033). That is to say that, in this case, the returned error IDs of the McCOM methods are resolved.
Parameter	error_text_user_of_id
Data type	STRING
Data range	Maximum 256 characters
Dimension	----
Default value	-
Remarks	

1.35.4 Name of error log file (P-STUP-00170)

P-STUP-00170	Name of the error log file
Description	Name of the error log file (including directory and path information). No log file is created if not name is specified. If the parameter is not configured, the error log file is generated with the default file name.
Parameter	error_log_file_name
Data type	STRING
Data range	Maximum 256 characters
Dimension	----
Default value	error.log
Remarks	

If no path is specified in TwinCAT systems, the configured NC program path is used.

1.35.5 Maximum size of the error log file (P-STUP-00171)

P-STUP-00171	Maximum size of the error log file in bytes
Description	This parameter defines the maximum size of the error log file.
Parameter	error_log_file_max_size
Data type	SGN32
Data range	> 0 :maximum size of the error log file. If this size is exceeded, the original file is copied to a backup file (extension: <name>.bak) and the contents of the original file are deleted. == 0 : no backup file is created.
Dimension	----
Default value	100000
Remarks	

1.35.6 Waiting cycles before evaluation of PLC activation (P-STUP-00172)

P-STUP-00172	Waiting cycles before evaluation of PLC activation
Description	Waiting cycles in CNC ticks after an error has occurred before the PLC's activation mask for the filter rules is evaluated.
Parameter	error_plc_wait_cycles
Data type	UNS32
Data range	0 ... MAX(UNS32)
Dimension	----
Default value	-
Remarks	

1.35.7 Additional descriptive text (AO name) (P-STUP-00173)

P-STUP-00173	Additional descriptive text (AO name)
Description	Descriptive text (architecture object) that is additionally appended in the event of an error message.
Parameter	error_ao_name
Data type	STRING
Data range	Maximum 83 characters
Dimension	----
Default value	-
Remarks	

1.35.8 Logging a CNC resets (P-STUP-00166)

P-STUP-00166	Logging a CNC reset as event in error message output
Description	This parameter defines whether the CNC reset triggered by the user is included as an event in the error message log. Previous error messages are acknowledged when the CNC is reset. This always occurs regardless of the setting of P-STUP-00166.
Parameter	no_error_message_at_reset
Data type	BOOLEAN
Data range	0: a CNC reset is logged as warning 270076 in the error message output. 1 a CNC reset is not logged
Dimension	----
Default value	0
Remarks	Parameter only effective in TwinCAT systems.

1.36 Filter parameters for error handling on the platform (error_filter[i].*)

Users/machine manufacturers parameterise the required actions or filtering operations for error messages for each platform/channel/axis. For more information see @@[FCT-M7].

Structure name	Index
error_filter[i]	0 ≤ i ≤ 3 (maximum number of error filters: 4)

1.36.1 Error cause (P-STUP-00186)

P-STUP-00186	Cause of error
Description	The individual error codes can be listed as numbers or texts, whereby the entire row must comply with the following syntax: (number | text) {, (number | text) } where: number:= CNC error number text:=" error-specific text " Example: error_filter[0].reason := "D012:", 123000, 123001 If an error is logged, the program looks in the defined platform/channel/axis filters whether a user-specific filter rule is defined for it.
Parameter	error_filter[i].reason where i = 0 ... 3 (maximum number of filters, application-specific)
Data type	STRING
Data range	Maximum 96 characters
Dimension	----
Default value	-
Remarks	

1.36.2 Error action (P-STUP-00187)

P-STUP-00187	Error action
Description	Action that is to be performed if an error occurs.
Parameter	error_filter[i].action where i = 0 ... 3 (maximum number of filters, application-specific)
Data type	STRING
Data range	ACTION = NONE | DRIVE_STATE_REQ | PRE_RUN_STATE_REQ | RUN_STATE_REQ NONE: No action DRIVE_STATE_REQ: Read out drive status PRE_RUN_STATE_REQ: Error at start-up of the controller bus in PRE-run state RUN_STATE_REQ: Error at start-up of the controller bus in Run state
Dimension	----
Default value	-

Remarks	For SERCOS drive profiles: DRIVE_STATE_REQ: S-0-0095 diagnostic PRE_RUN_STATE_REQ: S-0-0021: list of unknown operation data in CP2 -> CP3, command 127 RUN_STATE_REQ: S-0-0022: list of unknown operation data in CP3 -> CP4, command 128 For ProfiDrive profiles: <all actions> Parameter 945 For CANopen profiles <all actions> Parameter ID603F

1.36.3 Conditional activation (P-STUP-00188)

P-STUP-00188	**Conditional activation**
Description	This filter rule is activated when the applicable bit is set via the user interface or the PLC (HLI::Control Unit).
Parameter	error_filter[i].conditional_activation where i = 0 ... 3 (maximum Number of filters, application-specific)
Data type	UNS32
Data range	32-bit
Dimension	----
Default value	0
Remarks	Parameterisation example: *error_filter[0].conditional.action_activation 0x2* An activation bit = 0 means that the action is always executed.

1.36.4 Conditional action (P-STUP-00189)

P-STUP-00189	**Conditional action**
Description	Action that is to be executed if an error occurs and if the condition applies.
Parameter	error_filter[i].conditional_action where i = 0 ... 3 (maximum number of filters, application-specific)
Data type	STRING

Data range	ACTION = NONE | ([HIDE] [FORCE]) FORCE = F_WARNING | F_SYNTAX | F_ERROR | F_SEVERE | F_FATAL HIDE = [HIDE] [HIDE_LOG] [HIDE_PRINT] [HIDE_REPORT] NONE: no action HIDE: Suppress every error output HIDE_LOG: Error output to error log file is suppressed HIDE_DISPLAY: Error output is suppressed HIDE_REPORT: Application-specific error output is suppressed F_WARNING: Error is output as a WARNING (remedy class = 0) F_SYNTAX: Error is output as a syntax error (remedy class = 2) F_ERROR: Error due to NC program or other operator action (error remedy class = 5) F_SEVERE: Severe error, requires a warm start (remedy class = 6) F_FATAL: Severe error, requires a complete cold start (remedy class = 7)
Dimension	----
Default value	-
Remarks	

1.36.5 Conditional filter activation (P-STUP-00190)

P-STUP-00190	**Conditional filter activation**
Description	The individual error codes can be listed as numbers or texts, whereby the entire row must comply with the following syntax: (number | text) {, (number | text) } where: number:= CNC error number text := **"** error-specific text **"**
Parameter	error_filter[i].conditional_param where i = 0 ... 3 (maximum number of filters, application-specific)
Data type	STRING
Data range	Maximum 96 characters
Dimension	----
Default value	-
Remarks	Parameterisation example: *error_filter[0].conditional.param "*D012:", 123, 1001 Individual error texts are only checked when the SERCOS drive error S95 is read out. Error numbers are only checked in case of SERCOS drive errors (S21 and S22) and in case of ProfiDrive drive errors (parameter 945).

1.36.6 Output of additional error information (P-STUP-00191)

P-STUP-00191	**Output of additional error information**

Description	This text is forwarded transparently via the CNC_ERROR_INFO data structure if the filter condition applies. This means the user has the option to output an additional error text.
Parameter	error_filter[i].conditional_output where i = 0 ... 3 (maximum number of filters, application-specific)
Data type	STRING
Data range	Maximum 32 characters
Dimension	----
Default value	-
Remarks	

1.37 Setting units for PLCopen

These functions are available as of CNC Build V2.11.2808.02.

1.37.1 Positions for linear axes (P-STUP-00192)

P-STUP-00192	Setting the units of linear axis positions for PLCopen
Description	This parameter can be set for PLCopen function blocks and transfers the unit of linear axis position specifications to the function block.
Parameter	plcopen_unit.linear.position
Data type	STRING
Data range	um Positions in µm mm Positions in mm m Positions in m
Unit	----
Default value	-
Remarks	If none of the above mentioned unit specifications is configured, positions are specified in the unit 0.1µm

1.37.2 Velocities for linear axes (P-STUP-00193)

P-STUP-00193	Setting the linear axis velocity unit for PLCopen
Description	This parameter can be set for PLCopen function blocks and transfers the unit of linear axis velocity specifications to the function block.
Parameter	plcopen_unit.linear.velocity
Data type	STRING
Data range	um/s Velocity specifications in µm/s mm/min Velocity specifications in mm/min mm/min Velocity specifications in m/min m/s Velocity specifications in m/s mm/s Velocity specifications in mm/s
Unit	----
Default value	um/s
Remarks	

1.37.3 Velocities for linear axes (P-STUP-00194)

P-STUP-00194	Setting the linear axis velocity unit for PLCopen
Description	This parameter can be set for PLCopen function blocks and transfers the unit of linear axis velocity specifications to the function block.
Parameter	plcopen_unit.linear.acceleration
Data type	STRING
Data range	mm/s2 Acceleration in mm/s² m/s2 Acceleration in m/s² mm/min2 Acceleration in mm/min²
Unit	----
Default value	mm/s2

Remarks	

1.37.4 Jerk for linear axes (P-STUP-00195)

P-STUP-00195	**Setting the linear axis jerk unit for PLCopen**
Description	This parameter can be set for PLCopen function blocks and transfers the unit of linear axis jerk specifications to the function block.
Parameter	plcopen_unit.linear.jerk
Data type	STRING
Data range	mm/s3 Jerk in mm/s³ m/s3 Jerk in m/s² mm/min3 Jerk in mm/min²
Unit	----
Default value	mm/s3
Remarks	

1.37.5 Positions for rotary axes (P-STUP-00196)

P-STUP-00196	**Setting the units of rotary axis positions for PLCopen**
Description	This parameter can be set for PLCopen function blocks and transfers the unit of rotary axis position specifications to the function block.
Parameter	plcopen_unit.rotary.position
Data type	STRING
Data range	mdeg Positions in milli° deg Positions in ° rev Positions in revolutions U Positions in revolutions
Unit	----
Default value	-
Remarks	If none of the above mentioned unit specifications is configured, positions are specified in the unit 10^-4°

1.37.6 Speeds for rotary axes (P-STUP-00197)

P-STUP-00197	**Setting the units of rotary axis speeds for PLCopen**
Description	This parameter can be set for PLCopen function blocks and transfers the unit of rotary axis speed specifications to the function block.
Parameter	plcopen_unit.rotary.speed
Data type	STRING
Data range	mdeg/s Speeds in milli°/s U/min Speeds in revolutions/s U/s Speeds in revolutions/s rpm Speeds in revolutions/min rev/min Speeds in revolutions/min rev/s Speeds in revolutions/s deg/min Speeds in °/min deg/s Speeds in °/s
Unit	----
Default value	mdeg/s

Remarks	

1.37.7 Speeds for rotary axes (P-STUP-00198)

P-STUP-00198	**Setting the units of rotary axis speed for PLCopen**
Description	This parameter can be set for PLCopen function blocks and transfers the unit of rotary axis speed specifications to the function block.
Parameter	plcopen_unit.rotary.acceleration
Data type	STRING
Data range	m/s2 Acceleration in m/s² rev/s2 Acceleration in revolutions/s² U/s2 Acceleration in revolutions/s² deg/min2 Acceleration in °/s²
Unit	----
Default value	deg/s2
Remarks	

1.37.8 Jerk for rotary axes (P-STUP-00199)

P-STUP-00199	**Setting the units of rotary axis jerk for PLCopen**
Description	This parameter can be set for PLCopen function blocks and transfers the unit of rotary axis jerk specifications to the function block.
Parameter	plcopen_unit.rotary.jerk
Data type	STRING
Data range	deg/s3 Jerk in °/s³ rev/s3 Jerk in revolutions/s³ U/s3 Jerk in revolutions/s³ deg/min3 Jerk in °/min³
Unit	----
Default value	deg/s3
Remarks	

2 Example of assigning the start-up list

Configuration with 2 channels and a total of 6 axes:

```
# ********************************************************************
# ********************************************************************
configuration TWO_CHANNEL_CKONFIGURATION
kanal_anzahl 2
ext_var_max 200
plc_mode 0
sercos_hochlauf 1
listen ASCII
# ********************************************************************
# Lists of 1st channel
# ********************************************************************
default_sda_mds ..\listen\default_sda.lis
sda_mds[0] ..\listen\sda_mds1.lis
werkz_data[0] ..\listen\werkz_d1.lis
nullp_data[0] ..\listen\nullp_d1.lis
pzv_data[0] ..\listen\pzv_d1.lis
ve_var[0] ..\listen\ext_var1.lis
fb_storage_size[0] 0x200000
# ********************************************************************
# Lists of 2nd channel
# ********************************************************************
sda_mds[1] ..\listen\sda_mds2.lis
werkz_data[1] ..\listen\werkz_d2.lis
nullp_data[1] ..\listen\nullp_d2.lis
pzv_data[1] ..\listen\pzv_d2.lis
ve_var[1] ..\listen\ext_var2.lis
fb_storage_size[1] 0x200000
# ********************************************************************
# Channel-independent lists
# ********************************************************************
hand_mds ..\listen\hand_mds.lis
hmi[0].objects ..\listen\objects1.lis
hmi[0].mode write+
hmi[1].objects ..\listen\objects2.lis
hmi[1].mode write+
channel[0].objects ..\listen\channel1.lis
channel[0].mode write+
channel[1].objects ..\listen\channel2.lis
channel[1].mode write+
rtconf_lis ..\listen\rtconf.lis
konf_path ..\listen
#
# ********************************************************************
# Axis machine data
# ********************************************************************
zahl_mds 6
default_achs_mds ..\listen\default_mds.lis
achs_mds[0] ..\listen\achsmds1.lis
achs_mds[1] ..\listen\achsmds2.lis
achs_mds[2] ..\listen\achsmds3.lis
achs_mds[3] ..\listen\achsmds4.lis
achs_mds[4] ..\listen\achsmds5.lis
achs_mds[5] ..\listen\achsmds6.lis
#
# ********************************************************************
# Offset value lists
# (masked by comment characters)
# ********************************************************************
# zahl_kw 4
# achs_kw[0] ..\listen\achskw1.lis
# achs_kw_log_ax_nr[0] 1
# achs_kw[1] ..\listen\achskw2.lis
# achs_kw_log_ax_nr[1] 2
# achs_kw[2] ..\listen\achskw3.lis
# achs_kw_log_ax_nr[2] 3
# achs_kw[3] ..\listen\achskw4.lis
# achs_kw_log_ax_nr[3] 4
#
# ********************************************************************
# Program paths:
# ********************************************************************
# path[ <channel_number> ].prg[ <Index> ]
# prg -> Program path specification
# log_nr -> logical program path number
```

```
# typ -> Program path type ( 0x01 main program path )
# ( 0x02 Subroutine path )
# ( 0x03 main program and subroutine path )
# priority -> Specifies the program path priority if
# several program paths of the same type are specified.
#
# Program path Channel 1
pfad[0].prg[0]        x:\nc_prg
pfad[0].log_nr[0]     1
pfad[0].typ[0]        0x03 # Main program and subroutine path
pfad[0].prioritaet[0] 1
#
pfad[0].prg[1]        x:\nc_prg\cycles
pfad[0].log_nr[1]     2
pfad[0].typ[1]        0x02 # Subroutine path
pfad[0].prioritaet[1] 2
#
pfad[0].prg[2]        x:\test
pfad[0].log_nr[2]     3
pfad[0].typ[2]        0x03 # Main program and subroutine path
pfad[0].prioritaet[2] 3
#
# Program path Channel 2
pfad[1].prg[0]        ..\prg
pfad[1].log_nr[0]     1
pfad[1].typ[0]        0x01 # Main program path
pfad[1].prioritaet[0] 1
#
pfad[1].prg[1]        ..\prg\sub
pfad[1].log_nr[1]     2
pfad[1].typ[1]        0x02 # Subroutine path
pfad[1].prioritaet[1] 2
#
End
```

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