UPGRADE INSTRUCTIONS

valid for

SINUMERIK 840D
Software Version 07.04.30.00

1   Requirements for Upgrade

Software version 07.04.30.00 (NCK 67.09.03) is an update software version.

The current upgrade instructions are part of the delivery releases in ProdIS Update.

1.1   System software 07.04.30.00 (NCK Version 67.09.03)

Export versions		
Order number	**Designation** ... on PC card **16MB**	**For hardware**
6FC5250-7DY30-4AH0	NCU system software 2 axes	NCU *.**4**/ NCU*.**5**
6FC5250-7CY30-4AH0	NCU system software 6 axes	NCU *.**4**/ NCU*.**5**
6FC5250-7BY30-4AH0	NCU system software 12 axes	NCU *.**4**/ NCU*.**5**
6FC5250-7AY30-4AH0	NCU system software 31 axes	NCU *.**4**/ NCU*.**5**
6FC5250-7HY30-4AH0	NCU system software for 4 axes, grinding	NCU *.**4**/ NCU*.**5**
Standard versions (subject to export restrictions)		
Order number	**Designation** ... on PC card **16MB**	**For hardware**
6FC5250-7CX30-4AH0	NCU system software 6 axes	NCU *.**4**/ NCU*.**5**
6FC5250-7BX30-4AH0	NCU system software 12 axes	NCU *.**4**/ NCU*.**5**
6FC5250-7AX30-4AH0	NCU system software 31 axes	NCU *.**4**/ NCU*.**5**

Software V07.04.nn cannot be used for older module types.
The following module types are permitted:
6FC5356-0BB14-0AA_
6FC5356-0BB15-0AA_
6FC5357-0BB34-0AE1
6FC5357-0BB_4-0AA_
6FC5357-0BB_5-0AA_
6FC5357-0BB35-0AE0

1.2   Tools

- A 16MB PC card (6FC5247-0AA11-1AA3) is required for software version V07.04.nn.

- 6FC5250-6AY00-3AG0 (...-4AG0) SinuCom NC with SinuCom FFS **(**versions 7.1 / 7.2 are available in addition; version 7.3)
- 6FC5252-7AX21-4AG0: tool box AB 07.04.01 with basic PLC program 07.04.01.
  Tool box V 07.04.03 is the current version.
  PG / PC with STEP 7 V5.2 and higher and optional online MPI link.
- Current documentation for SW 7 with additional function-related information.

1.3   PLC operating system

- PLC314C-2DP on NCU *.4 firmware version >= 10.60.22
- PLC317-2DP on NCU *.5 firmware version >= 20.71.30

1.4   Machine control panel

Version 02.01.01
(Version 01.02.03 enables bus address 6 only)

2   Data backup

2.1   General requirements for upgrade

Before upgrading the NCK ensure that at least 50KB dynamic memory is available for each channel. This can be checked in MD18050 INFO_FREE_MEM_DYNAMIC. If less memory is available, additional memory must be provided by extending MD18210 USER_MEM_DYNAMIC. If this is not possible, a more powerful CPU must be used, or unused memory must be released. The machine data, which are identified in the list as D-RAM, are suitable for this purpose.

An additional 50KB of static memory should be available. This can be checked with MD18060 INFO_FREE_MEM_STATIC. If the available memory is insufficient, memory space can be freed by unloading NC programs.

Set machine data 11210 UPLOAD_MD_CHANGES_ONLY = FF, 11220 INI_FILE_MODE = 1 or 2.

2.2   Data backup

- **NCK**
  Before the NCK is upgraded, a backup must be made to permit recovery of the machine's current database. This is done by creating a series startup file (see general instructions for software upgrades).

- **PLC**
  In addition to the NCK backup, a PLC backup must be created. This backup must be performed with the PLC in the STOP state. Set S4 on the NCU module to position 2. The PLC will then be in stop position.

  STEP 7 is required for upgrade of the basic PLC program. For this purpose, the new tool box must be installed using SETUP. You also need the customer project of this system. The required blocks are transferred from the new Toolbox library to the customer project (or a copy). OBs FC12 and DB 4 must not be transferred (these are blocks for creating new user programs) because they have been modified by the machine manufacturer. After replacement of the NCK software transfer the modules to the PLC using STEP7. Create a new PLC series start-up file.

- **Replacing the software**
  Switch off the control and replace the PC card. The card stays in the control.
  Set switch S3 to position 1, set S4 to position 3 and switch on the control. When it has powered up, the state "7-segment display shows digit 6 / PLC LED PS flashes / PF red" is established.
  The NC standard machine data have now been loaded. NC and PLC are cleared.

  The PLC is started up by switching S4 from position 3 to position 0
  => S4 in position 3 => S4 in position 0. Now the PLC must switch to Run mode.
  Set S3 to position 0.
  You can check the software version in menu *Diagnostics/Service Displays/Version*.

- **Loading the backups**
  Once the manufacturer password has been set, the NCK backup can be loaded in the menu *Services/Series startup/Load startup archive*/ after selecting the backup file.
  Once completed, the PLC backup can be loaded.
  Once the PLC backup file has been loaded, you must switch the system off and on again so that all components are powered up at the same time.

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3 General Information

3.1 General restrictions

- Function G643 (block-internal smoothing) has been released for applications in the tool change area (e.g. optimizations for approaching the tool change position).
  It is not enabled for applications in the machining process.
- Function G644 (smoothing at max. possible dynamics) has been released for applications in the tool change area (e.g. optimizations for approaching the tool change position).
  It is not enabled for applications in the machining process.
- The functions FCUB and FLIN in combination with the compressor COMPCAD have not been released.
- Slave operation of the PROFIBUS is not possible with NCU*.4. If a configuration like that is required, it will have to be implemented using a CP module or an NCU *.5.

3.2 Frames

If $MC_MM_SYSTEM_FRAME_MASK bit 1 = 1, the external work offset will be suppressed by G153. This represents a change in behavior compared to other releases of software version 6.

The default setting of $MC_CHSFRAME_POWERON_MASK has changed. The default value of MD24008 is now zero (previously "one"). The system frame for the scratching function is therefore also retained after Power ON / RESET.

3.3 Series or upgrade archive

A series or upgrade archive enables identical machines to be brought into operation quickly and easily. These machines must be identical in respect of both electrical equipment (e.g. NCU CPU, software) and mechanical conditions. If they do not match, a series or upgrade archive is not necessarily a suitable startup method. Another data backup method will then have to be chosen (e.g. separate data backups with Initial.ini etc.), as machine data may have to be adapted.
Special attention has to be paid to the different memory limits of the NCUs. If they have been fully utilized, the memory space might not suffice after an NCK software upgrade or replacement of an NCU.
Prior to creating the data backups, machine data $MN_UPLOAD_MD_CHANGES_ONLY is to be checked. It should be set to the value "0" or "FF"hex. Other values such as "1" may cause problems on reading in the data backup after software upgrades. The value FFhex is the preferred entry.

3.4 Restriction of the number of axes and channels

As from software version 6.5.10, the different software variants (2-axis...31-axis versions) can be used on all type **.4** and *.**5** NCUs.
PLC programs can thus be maintained as general programs that can be used for different machine variants. This way it is possible to manage 6, 12 or 31 physical axes out of 31 axes.
The restriction of the number of axes and channels still applies.
The following combinations are possible:

```
HW \ SW          2A/2C   6A/2C      12A/2C        31A/10C
---------------------------------------------------------------------------------
561.4 / 5     |  2A/2C   2A/2C      2A/2C         2A/2C
              |
571.4 / 5     |  2A/2C   6(31)A/2C  6(12)A/2C     6(31)A/2C
              |
572.4 / 5     |  2A/2C   6(31)A/2C  12(31)A/2C *) 31A/6C
              |
573.4 / 5     |  2A/2C   6(31)A/2C  12(31)A/2C *) 31A/10C
```

A=axes, C=channels, 2(31)=2 out of 31 axes
*) For software version 07.02.12 and higher: 12(31)A/4C

3.5   DMP block

The number of axes including the DMP block is limited to 31. If, for example, a DMP block is used with 31-axis software, a total of 30 axes are still possible.

3.6   Alarm 14132: Incorrect configuration of orientation axes

This alarm is output in case of errors on assigning orientation axes to the machine kinematics. However, this alarm will also occur if no position measuring system is active on an axis involved in the transformation.

3.7   Alarm 10752: Local block buffer overflow during tool radius compensation

Output of alarm 10752 can be avoided by increasing machine data $MC_CUTCOM_MAXNUM_DUMMY_BLOCKS=41.

3.8   Alarm 380001 PROFIBUS DP: Run-up error cause 1002 parameter 00

The alarm is displayed after PLC delete with S4 in position 3. It should not be displayed again after loading of the basic PLC program.

3.9   Alarm 15150 Reloading from external sources was aborted

Output of alarm 15150 can be avoided by increasing the value of machine data $MN_MM_EXT_PROG_BUFFER_SIZE.

3.10   Spindle data

The machine data for describing the spindle dynamics must be set so that they approximately correspond to the actual dynamics of the spindle. If the values are increased unnecessarily, alarms may be issued during the changeover from spindle to positioning mode.

3.11   NCU system resources

In "Reset" status, the load imposed on the NCU by the position controller and interpolator should not exceed 60–65%. The current load can be checked under Diagnostics/System resources.

3.12   Series or upgrade archive with software version 7.4

Alarms may occur after a series or upgrade archive has been read in.
As from software version 07.04.07.00, the cycles for generic couplings are automatically read into the NC from the PC card after a general reset. These cycles occupy dynamic memory.
The settings for the machine data 18170 $MN_MM_NUM_MAX_FUNC_NAMES and 18180 $MN_MM_NUM_MAX_FUNC_PARAM may therefore have to be re-determined.
Typical values are:
18170 $MN_MM_NUM_MAX_FUNC_NAMES (nn)   + 18
18180 $MN_MM_NUM_MAX_FUNC_PARAM (nn) + 120

If a series or upgrade archive generated with software version 7.4 is read into a deleted NCU, then the query "Cycle nn already exists ... overwrite ..." may be displayed. .
This query can be acknowledged negatively.

Upgrade Instructions SINUMERIK 840D
                                                                                        2008-10-28

3.13 Log File for Sinumerik 840D version 07.04.30 standard 31 axes

```
.----------------------------------------------.
|           P C M _ V E R S                    |
| usage:  Version: V02.03  from 21.06.99        |
| <path / name of PCM - imagefile *.abb  >      |
|        SINUMERIK 840D   AUT/E231              |
|            C O N T E N T S                    |
|   07.04.30 840D 31A   B7ph_km                 |
.----------------------------------------------.
```

PCM - Version: 02.18

```
-------------------------------------------------------------------------------------------
System            Versionstamp    Date   Checksum Linkdate/Time     Length    at
-------------------------------------------------------------------------------------------
Monitor Loader       67.09.03 30/09/08 300908 97722BDD 30/09/08 11:42:50   017E44 000140
Communic.Monitor     01.01.07 10.05.94|100594 5C080795 10/05/94 13:26:36   0030D0 017F84
Communic.System      05.07.00 05/03/14|150305 7F89160B 15/03/05 15:01:40   00D0D8 01B054
PLC314C-FB15SI07.04.03  07.04.03*07/04/19 200407 48558BC3 20/04/07 14:24:0000AAC4 02812C
PLC317-FB15 SI07.04.03  07.04.03*07/04/19 200407 0E59A312 20/04/07 14:28:09008200 032BF0
Monitor System       67.09.03 30/09/08 300908 5CBFFA25 30/09/08 11:42:22   0040E0 03ADF0
Operating System     67.09.03 30/09/08|300908 D10368BE 30/09/08 11:43:04   00BFA8 03EED0
Numeric ContSI67.09.03  67.09.03 30/09/08| 71008 9D789A25  7/10/08 13:55:47 3B346C 04AE78
VSA System  SI05.01.35  05.01.39 21/07/08 210708 280F3E32 21/07/08 13:03:02 03CA0C 3FE2E4
VSA Data Description   05.01.39 21/07/08 030308 5BB209A7 03/03/08 15:11:56  004C90 43ACF0
VSA Default Data     05.01.39 21/07/08 030308 848D5B51 03/03/08 15:11:56   000BB8 43F980
Drive Version Info   05.01.39 21/07/08 190208 62F8CDFA 19/02/08 09:52:32   022648 40538
HSA System  SI05.01.35  05.01.39 21/07/08 210708 7664FFF8 21/07/08 13:04:25 03CDB8 462B80
HSA Data Description   05.01.39 21/07/08 030308 2305260D 03/03/08 15:11:56  005F10 49F938
HSA Default Data     05.01.39 21/07/08 030308 FE9EC7B8 03/03/08 15:11:56   000E98 4A5848
SLM Data Description   05.01.39 21/07/08 030308 EA1DF0F1 03/03/08 15:11:56  004AD0 4A66E0
SLM Default Data     05.01.39 21/07/08 030308 BE7AF4AD 03/03/08 15:11:56   000BB8 4AB1B0
Inverter Codes      06.08.24 16/07/08 170708 D079EEC9 17/07/08 15:22:42    0010E8 4ABD68
VSA Motor Codes      06.08.24 16/07/08 170708 7FD69BF7 17/07/08 15:22:47   00CB5C 4ACE50
HSA Motor Codes      06.08.24 16/07/08 170708 6FB5D7C7 17/07/08 15:22:43   003B04 4B99AC
SLM Motor Codes      06.08.24 16/07/08 170708 BA7EA054 17/07/08 15:22:46   004704 4BD4B0
VSA Inverter Data    06.08.24 16/07/08 160708 430A7EEE 16/07/08 20:16:51   000518 4C1BB4
VSA Motor Data      06.08.24 16/07/08 160708 C106E6A9 16/07/08 20:16:52    00D0B0 4C20CC
HSA Inverter Data    06.08.24 16/07/08 160708 62603196 16/07/08 20:16:52   0003A0 4CF17C
HSA Motor Data      06.08.24 16/07/08 160708 9BBBE1A8 16/07/08 20:16:52    0051C8 4CF51C
SLM Motor Data      06.08.24 16/07/08 160708 06372C5D 16/07/08 20:16:53    003140 4D46E4
DriveSystem SI06.08.20  06.08.25 15/08/08 150808 D5C494DF 15/08/08 11:09:17 061E68 4D7824
VSA-2 Data Description  06.08.25 15/08/08 150808 302D1FBD 15/08/08 11:08:39 00B390 53968C
VSA-2 Default Data    06.08.25 15/08/08 150808 5D1FBD2A 15/08/08 11:08:41  002524 544A1C
HSA-2 Data Description  06.08.25 15/08/08 150808 0E622FF5 15/08/08 11:08:39 00AA50 546F40
HSA-2 Default Data    06.08.25 15/08/08 150808 7EF4106D 15/08/08 11:08:41  00250C 551990
SLM-2 Data Description  06.08.25 15/08/08 150808 407DECC6 15/08/08 11:08:39 00B250 553E9C
SLM-2 Default Data    06.08.25 15/08/08 150808 2849FA43 15/08/08 11:08:41  002504 55F0EC
HLA System          01.02.15 21/12/05 211205 A7DE713A 21/12/05 14:06:16    0359C0 5615F0
HLA Data Description   01.02.15 21/12/05 211205 962F04E3 21/12/05 14:06:43  003410 596FB0
HLA Default Data     01.02.15 21/12/05 211205 3393C91E 21/12/05 14:06:44   000D78 59A3C0
HLA Valve Data      01.02.15 21/12/05 211205 4F233E4D 21/12/05 14:35:49    001E68 59B138
Driver Module       01.01.01 14.06.94  50899 B838268F  5/08/99 18:30:36    0000C4 59CFA0
Serialnumber        01.01.01 24.01.95 221100 0327C431 22/11/00 11:27:40    0000D4 59D064
Adaption Cycles      07.01.09 17/09/07 170907 79430E09 17/09/07 10:57:33   002E60 59D138
Joblist for IBN      02.03.00 03/24/06  71008 77BE5ECE  7/10/08 13:56:27   00039C 59FF98
Joblist for IBN/KOMP   02.03.00 03/24/06  71008 723B1E09  7/10/08 13:56:28  0003CC 5A0334
Joblist for UPGRADE    02.03.00 03/24/06  71008 DF7F2D38  7/10/08 13:56:29  0003B4 5A0700
Link Loader         05.01.01 98/06/03 061098 F50A5D72 06/10/98 08:37:23    00029C 5A0AB4
Link Debugger Aequidis 05.03.01 00/11/28 281100 E5024825 28/11/00 13:42:35 0091AC 5A0D50
Link Software Aequid   05.02.05 02/01/07|070102 6083ACE7 07/01/02 11:05:01  008A8C 5A9EFC
DP Software Aequid    01.00.06 02/08/13|130802 FCAE5BA2 13/08/02 10:36:01  01FC18 5B2988
NCKS840d-31a10c       67.09.03 09/30/08  71008 BA3FC3DE  7/10/08 13:56:21  0008D8 5D25A0
NCKS840d-31a10c       67.09.03 09/30/08  71008 BA3FC3E6  7/10/08 13:56:21  0008D8 5D2E78
NCKS840d-31a10c6      67.09.03 09/30/08  71008 3A2097F3  7/10/08 13:56:23  000930 5D3750
NCKS840d-2a2c        67.09.03 09/30/08  71008 02CA6EE2  7/10/08 13:56:20   000DA8 5D4080
-------------------------------------------------------------------------------------------
number of bytes: 0x005D4E28   length of ABB file:  0x01000000
```

Upgrade Instructions SINUMERIK 840D

2008-10-28

3.14 Machine control panel

The machine control panel is operated on MPI, OPI or via PROFIBUS.

3.15 Contour handwheel

The 'Contour handwheel' function is now locked through an option.
If the function is selected through the VDI interface DB[channel].DBB30 without a set option, travel-out of NC distances-to-go will not be derived from the handwheel motion (as previously). Present distances-to-go are moved out of the material and alarm "22400 channel%1 option contour handwheel not set" (cancel clear) is displayed.

3.16 Alarm 1000 system error 100000

The 16MB PC card can only be used in certain NCU modules (see section 1.1).

3.17 NC programs with active basic tool orientation

NC programs with active basic tool orientation and, if required, combined with the function of tool holders with orientation capability (swivel, CYCLE800) must be re-loaded.

4 Secondary Conditions

4.1 PLC memory capacity of NCU *.4

A load memory of 480KB is guaranteed for the user. It is possible to exceed this limit, i.e. to occupy more memory space. However, this may cause problems on reading in PLC series star-up files. Message: Memory full.

4.2 Auxiliary functions in OB40

Sporadically, the PLC does not recognize auxiliary functions in the following combinations:
H/T function analysis in OB40 (parameter IRAuxfuT/H =true of FB1)
In the part program:
m=qu(55)
h2=33
The H function is lost sporadically.
Remedy: Program m55.

4.3 Coupled-axis groupings

When coupled-axis groupings are switched on via synchronized actions or across the channels, the user must assure that the control parameters (e.g. acceleration, velocity) of the slave axis are met. In these cases, no verification is performed in the NC.

4.4 NCU link

When NCUs are combined via the link function, NCUs of the same type (MLFB) always have to be used.

If a link connection with different interpolation cycles is to be configured, the basic system clock rates of both systems must be the same. Otherwise alarm 4013 is displayed with error code SYSCLOCK_SAMPLE_TIME_RATIO.

Exception:
It must be taken into consideration that processors with different cycles are used in the NCUs. If a service job can only replace a module by a faster NCU, the slower NCU must be the master. It is not mandatory to replace all NCUs.

4.5 Gantry axes

If the slave axis in a gantry grouping rotates in the opposite direction (AX_MOT_DIR=1), the function generator (rectangular) must not be used.

4.6 Loadable compile cycles

It is possible to load a maximum of ten loadable compile cycles. They include libraries with the file extension ???.ELF.

Loading more than one technological function may cause incorrect value assignments. This effect will occur if loadable compile cycle applications do not set up their machine data with consecutive ascending numbers within the three sections NCK, channel and axis MD.
Loading a correct archive may cause mutual overwriting of the contents of individual CC machine data.

4.7 Alarm 4185

Assigned help functions that are neither active nor have been rejected by an alarm are now recognized. Alarm 4185 is output in this case.

4.8 Program pre-processing

When the program pre-processing function is used, alarms 15170 "Program could not be compiled" and 15450 "Unable to save the compiled program" are output after an upgrade to SW 6.4.
Reason:
Under SW 6.4, the compiled program is no longer stored in SRAM, but in DRAM instead.
However, sufficient DRAM memory has to be reserved for this purpose via MD $MN_MM_DRAM_FILE_MEM_SIZE.
But there is also the option of storing the compiled program in SRAM, if the DRAM memory space does not suffice. To do so, set $MN_PREPROCESSING_LEVEL, bit 6.

4.9 PLC starting behavior

- It is impermissible to operate NCU *.4 in switch position 1 of S4. The PLC would not start the cyclic operation after RESET or Power OFF/ON.
- If the PLC was put to a STOP state by a PI service or a PG operation (e.g. on loading a hardware configuration), it will have to be restarted by a PG operation or by using switch S4. Power OFF/ON or RESET will not start the cyclic operation.

4.10 Alarm 380040 in software version 7.2.nn

If the alarm is displayed in powerline, an address conflict between the existing PLC I/Os and the prepared machine data for solution line has occurred. In the case of an error, an address must be assigned in machine data MD 13050 Drive Logic Address which has not been configured in the PLC.

4.11 ~~Note for using the dynamic group G commands "DYNNORM / DYNPOS etc."~~

~~(for software version 7.2 and higher)~~
~~This function has not been released.~~

5 Overview of New Functions in Software V 07.04.07.00 and Higher

5.1 Couplings

Due to the introduction of generic couplings, the user can select the coupling characteristics required for his application. This is achieved by flexible programming. Additional coupling characteristics can be used later without a problem.

5.2 Output order of the M functions can be specified after block search

The collected values of the M functions after block search are available through the system variables. The order can be determined by a predefined procedure.
The correct order and tool dependency, if required, can be ensured in the ASUB after block search by using an application. Current output of the M functions can be locked with NC start after block search.

5.3 Conversion routines RTOB/BTOR

Conversion routines rtob/btor have been implemented for changeover from REAL<>BOOL.

Upgrade Instructions SINUMERIK 840D
2008-10-28

5.4 Safety

The number of safety checksums has been extended for version 7.4.6 and higher:
MD_SAFE_DES_CHECKSUM[0] and [1] and MD_SAFE_ACT_CHECKSUM[0] and [1] are available now.
For 840D powerline the value of the MD_SAFE_DES_CHECKSUM[1]=0.
Both checksums must be copied after upgrade.

5.5 Safety

The maximum values of the following machine data have been increased.
- safe_velo_switch_delay   ➔ 10 min.
- safe_stop_switch_time_c   ➔ 10 min.
- safe_stop_switch_time_d   ➔ 10 min.
- safe_stop_switch_time_e   ➔ 10 min.
- safe_pulse_disable_delay   ➔ 10 min.

5.6 Safety

There is a new option handling referring to synchronized actions or synchronized action elements. Up to NCK version 62 synchronized action level, 2 was set automatically at the same time with option SI. Thus, channel MD 28250, NUM_SYNC_ELEMENTS could be set to a value > 159.

This has been changed with NCK version 67. Synchronized action level 2 is no longer included in Safety. Instead there is a new machine data, in which the synchronized action elements for SAFE.SPF are defined, i.e. MD 28251, NUM_SAFE_SYNC_ELEMENTS.
This machine data can be written with a maximum value of 500 for option "SLP_I_O=1", and with a maximum value of 5000 for option "SPL_I_O=2".
However, the number of synchronized action elements required should be determined in order to prevent the performance from being loaded unnecessarily.

With system variable $AC_SAFE_SYNAC_MEM the relevant number of free SI synchronized action elements can be read.
If this variable is called prior to starting and after running SAFE.SPF, the difference is the number of elements occupied by SAFE.SPF. This difference adding a certain reserve should be entered in MD 28251.

5.7 TOOLMAN edge location considerations

Magazine edge locations can now be limited with regard to the tool size.

5.8 ET200Pro-F peripherals (I/Os)

ET200Pro-F peripherals (I/Os) are now supported and can also be used in combination with Safety Integrated.

5.9 DP/AS-I F-LINK

DP/AS-I F-LINK modules are supported with NCU software version >=V7.4.20. The use of DP/AS-I F-LINK modules requires PLC operating system version 20.70.31.

5.10 Machine data for individual version input

Individual machine data blocks (e.g. channel or axis machine data) can be identified by an individual ID that can be recognized in the control. For this purpose, machine data (that have not analyzed by the control) are now provided in the form of a character string, which can also be written through the startup archive and the standard HMI. The data entered by the user are displayed as additional information in the version screen of the NCU and can be read out with the machine configuration / version data.
Example:
$MN_OEM_GLOBAL_INFO[0] = mach. type nn / ChanData Version V 1.0

5.11 Access to the PROFIBUS I/Os of the NCK

The "NckProfibusCom" functionality enables direct data exchange between the NCK and the PROFIBUS I/Os. Data can be exchanged via synchronized actions in the part program or compile cycles.

5.12 PLC changes as from software 7.4

- This upgrade eliminates the blocks DB6, DB10, DB17, DB19, FC1, FC4, FC6, FC11, FC14, FB16, FB17, FB18, FB19. Data blocks DB10, DB17, DB19 are set up as CPU DB's. DB6 is completely eliminated.
- The interface bit "first cycle" is available in DB10.DBX104.6.
- The maximum number of PLC user alarms has been increased to 32 groups.

5.13 Thermal motor protection (as from Drive V06.08.13)

The purpose of thermal motor protection is to protect the motor from continuous overloading and to prevent it from heating above the permissible temperature.
A simplified explanation of the thermal motor protection is that a model motor temperature is internally calculated as a function of the motor type, the measured motor current, a KTY motor temperature sensor, if present, and the shutdown temperature threshold.
Involving the KTY motor temperature sensor prevents the motor from being overloaded even when switched on when hot.
The calculated model temperature is related to the permissible shutdown temperature of the motor defined in MD1607.
MD 1266 displays the current thermal loading motor as a percentage.
Motor temperature alarm 300613 "Maximum permissible motor temperature exceeded" is triggered if the thermal loading of the motor exceeds 100%, and as a reaction DRIVE-READY and 611D ready are canceled (no change to previous alarm behavior).
The thermal motor protection is activated by MD 1265 "ACTIVITY_I2TMOT" bit 0.
The type of motor monitoring can be selected with MD 1265.BIT1:

Bit 1= 0 with evaluation of the KTY sensor
Bit 1= 1 current monitoring only – no evaluation of the KTY sensor
Moreover the thermal motor protection is not activated if the value of MD 1268 =0 (winding time constant).

5.14 Second transverse axis in the channel

Even non-geometry axes may be treated like transverse axis (i.e. programming and display in the diameter).

6 General Notes on Software Upgrades

- Before the upgrade, series startup files and upgrade files must be created, which only contain machine data that differ from the default values. Machine data 11210 UPLOAD_MD_CHANGES_ONLY = FF is to be set for this purpose. This ensures that the machine data contain the originally set values after a software update even in the case of differing standard pre-assignments as a result of the respective software versions.
  However, machine data with the protection level **"System"** should be set to the default values applicable to the relevant software version. A data backup generated with 11210 UPLOAD_MD_CHANGES_ONLY = FF contains the machine data with their current values which differ from their defaults.

- In order to ensure that the machine data with the protection level "System" contain default values after a software update, it is essential to save the series startup file and upgrade file without "line check sum".
  Machine data 11230 MD_FILE_STYLE Bit 0 = 0 is to be set for this purpose.

- If the series start-up file with the protection level "**Manufacturer**" generated by UPLOAD_MD_CHANGES_ONLY = FF and MD_FILE_STYLE bit 0=0 is read in again, then the machine data with protection level "System" are not overwritten with the values from the backup files. They are set to the default values applicable to the relevant software version. This ensures that no obsolete settings are carried over which might not be executable with new software.

- After the data has been read in, the alarm log contains alarm 4075 "Data not changed because of lack of access rights". This alarm indicates that default values for system data have not been overwritten.

- If this procedure is not possible without line check sum (for example with a defective NCU), then a machine data file should be generated with UPLOAD_MD_CHANGES_ONLY=FF after the upgrade, and the machine data it contains should be checked. In this case, the following data in particular should be checked to ensure that they have their default settings.

  18240 LUD_HASH_TABLE_SIZE
  18242 MAX_SIZE_OF_LUD_VALUE
  18250 CHAN_HASH_TABLE_SIZE
  18260 NCK_HASH_TABLE_SIZE
  18290 FILE_HASH_TABLE_SIZE
  18300 DIR_HASH_TABLE_SIZE
  18500 EXTCOM_TASK_STACK_SIZE
  18502 COM_TASK_STACK_SIZE
  18510 SERVO_TASK_STACK_SIZE
  18512 IPO_TASK_STACK_SIZE
  18520 DRIVE_TASK_STACK_SIZE
  18540 PLC_TASK_STACK_SIZE
  18900 FPU_ERROR_MODE
  18910 FPU_CTRLWORD_INT
  18920 FPU_EXEPTION_MASK
  28500 PREP_TASK_STACK_SIZE

  Alternatively, an existing file can be modified with the tool SinuComArc, by deleting the machine data listed above (areas: Global.ini, Chan.ini, Initial.ini).

  The channel machine data 28070 NUM_BLOCKS_IN_PREP must be checked. The settings have often been modified by manufacturer-specific applications, for example memory and time optimizations. In the event of problems, at least the default values should be set here.

7   New Software Version after Hardware Replacement

- If an NCU is replaced by new hardware, it may happen that the old software version is no longer executable. It therefore also has to be upgraded to a newer software version by **trained** service personnel. In this connection, as from software version 3.7, in each case the last released version of the software series must be used (e.g. 3.7.20, 4.4.39, 6.2.10 etc.) with which the new NCU can be operated.

- The prerequisite for upgrading is the possibility of

- editing NCU data backups
- starting up drives
- starting up the PLC

and the availability of the necessary tools (e.g. SinuComArc, IBN-Tool, STEP 7, etc.).

- Memory configuration problems can occur while reading in the data backups, as "old" settings were also backed up in the data backups (see general notes).
  In this case, particular attention has to be paid to MD18210 USER_MEM_DYNAMIC and MD18230 USER_MEM_BUFFERED. The following data also have to be checked to ensure that they have their default settings.

  18240 LUD_HASH_TABLE_SIZE
  18242 MAX_SIZE_OF_LUD_VALUE
  18250 CHAN_HASH_TABLE_SIZE
  18260 NCK_HASH_TABLE_SIZE
  18290 FILE_HASH_TABLE_SIZE
  18300 DIR_HASH_TABLE_SIZE
  18500 EXTCOM_TASK_STACK_SIZE
  18502 COM_TASK_STACK_SIZE
  18510 SERVO_TASK_STACK_SIZE
  18512 IPO_TASK_STACK_SIZE
  18520 DRIVE_TASK_STACK_SIZE
  18540 PLC_TASK_STACK_SIZE
  18900 FPU_ERROR_MODE
  18910 FPU_CTRLWORD_INT
  18920 FPU_EXEPTION_MASK
  28500 PREP_TASK_STACK_SIZE

  Alternatively, an existing file can be modified with the tool SinuComArc, by deleting the machine data listed above (areas: Global.ini, Chan.ini, Initial.ini).

  The channel machine data 28070 NUM_BLOCKS_IN_PREP must be checked. The settings have often been modified by manufacturer-specific applications, for example memory and time optimizations. In the event of problems, at least the default values should be set here.

  In order to be able to check these data, the series startup file and upgrade file must be processed with the tool SinuComArc. One checks whether these data are in the backup before then deleting them. This does not overwrite the new default values.
  After reading in the edited data backup, the control should then be started. Memory options still have to be checked.

- **Notes:**
  The data backups cannot be edited with conventional editors (e.g. Word) and then read in again.

  Drive data (BOT files):
  There is an internal converter for BOT files, which ensures that drive data backups can be read into various software versions. However, the converter cannot be guaranteed to work for all software upgrade combinations. Boot file conversion is not provided until drive software version 06.01.01. It may also happen that the drives have to be restarted after an upgrade.

8 Functional Improvements and Further Developments in Comparison to 07.04.18.00

NCU 07.04.20

AP00438050	AP00459397	AP00452727	AP00461904	AP00464489	AP00433538
AP00456794	AP00485367	AP00459600	AP00461681	AP00464368	AP00473536

9 Functional Improvements and Further Developments in Comparison to 07.04.20.00

NCK 67.06.00

AP00307789	AP00313807	AP00332345	AP00350394
AP00371866	AP00375282	AP00378695	AP00394941
AP00395090	AP00399632	AP00404178	AP00405407
AP00413217	AP00414760	AP00414907	AP00417001
AP00418119	AP00421581	AP00425628	AP00426503
AP00427096	AP00430483	AP00431553	AP00433538
AP00434127	AP00438050	AP00439073	AP00443266
AP00447408	AP00448328	AP00451079	AP00452727
AP00457473	AP00459397	AP00459600	AP00461236
AP00461681	AP00461904	AP00464489	AP00477241

NCK 67.07.00

AP00306969	AP00307787	AP00308017	AP00347260
AP00370834	AP00383031	AP00385933	AP00395538
AP00401184	AP00422102	AP00425992	AP00426130
AP00426156	AP00451923	AP00456794	AP00464368
AP00466333	AP00467126	AP00468502	AP00471166
AP00472978	AP00473536	AP00473571	AP00474051
AP00477266	AP00479474	AP00480712	AP00481717
AP00481859	AP00483328	AP00483891	AP00484085
AP00484235	AP00485058	AP00485367	AP00486453
AP00490696	AP00491618	AP00491954	AP00493097
AP00493857	AP00494173	AP00494582	AP00496153

NCK 67.07.01
AP00485687

NCK 67.07.02

AP00490106	AP00502455	AP00502685	AP00505271
AP00507477			

NCK 67.07.03
AP00511365

NCK 67.07.04

AP00379998	AP00466543	AP00470399	AP00491529

AP00511914	AP00512702	AP00513076	AP00513353
AP00516269	AP00518244		

NCK 67.07.05

AP00343468	AP00440856	AP00480090	AP00485058
AP00504229	AP00507165	AP00511881	AP00513005
AP00518073	AP00523397	AP00530330	AP00530400

NCU 7.4.26 (NCK 67.07.06)

AP00522853	AP00522888	AP00522906	AP00526985
AP00532155	AP00533351	AP00540211	

10 Functional Improvements and Further Developments in Comparison to 07.04.26.00

NCK 67.07.07

AP00526880	AP00530505	AP00535281	AP00557112

67.07.08	AP00485930	AP00593940	

67.07.09	AP00541119	AP00545603	

67.07.10	AP00632879		

67.08.00			
AP00307638	AP00324160	AP00343468	AP00345040
AP00358136	AP00361551	AP00363854	AP00367468
AP00368155	AP00368478	AP00372547	AP00374278
AP00375425	AP00378594	AP00378709	AP00379998
AP00383392	AP00384008	AP00385933	AP00388653
AP00390368	AP00393741	AP00400502	AP00402018
AP00403179	AP00405035	AP00426214	AP00428598
AP00429296	AP00432334	AP00433603	AP00439841
AP00440856	AP00443739	AP00443982	AP00445390
AP00445700	AP00445749	AP00446603	AP00451027
AP00451783	AP00452522	AP00455048	AP00455456
AP00456160	AP00465085	AP00465312	AP00466543
AP00467734	AP00468043	AP00469062	AP00469188
AP00470399	AP00474775	AP00475114	AP00477191
AP00478145	AP00479603	AP00480090	AP00485058
AP00485507	AP00485687	AP00487642	AP00490106
AP00491529	AP00494204	AP00495606	AP00496005
AP00496144	AP00497040	AP00497704	AP00498224
AP00499352	AP00500708	AP00501056	AP00501061
AP00501068	AP00501097	AP00501722	AP00502455
AP00502685	AP00504229	AP00504894	AP00505271
AP00506536	AP00507165	AP00507477	AP00508718
AP00510377	AP00510397	AP00510907	AP00511365
AP00511467	AP00511593	AP00511825	AP00511881
AP00511914	AP00512450	AP00512702	AP00513005
AP00513076	AP00513353	AP00515440	AP00515937
AP00516269	AP00516313	AP00517802	AP00518073
AP00518244	AP00518578	AP00519429	AP00520942

AP00522089	AP00522853	AP00522888	AP00522906
AP00523048	AP00523397	AP00523825	AP00523862
AP00525032	AP00525103	AP00525185	AP00525710
AP00526880	AP00526985	AP00527403	AP00527477
AP00527707	AP00527922	AP00528081	AP00528515
AP00529940	AP00530330	AP00530400	AP00530505
AP00530643	AP00530976	AP00531852	AP00532155
AP00532168	AP00533351	AP00533548	AP00533900
AP00534906	AP00535281	AP00538012	AP00539276
AP00540093	AP00540211	AP00541119	AP00541927
AP00542649	AP00542833	AP00543649	AP00543792
AP00545206	AP00545947	AP00548575	AP00550852
AP00550901	AP00551472	AP00557112	AP00564677
AP00581903	AP00670739		

67.09.00			
AP00306970	AP00325604	AP00340892	AP00361358
AP00461078	AP00467126	AP00485930	AP00494158
AP00520656	AP00541184	AP00542630	AP00545603
AP00547220	AP00551594	AP00551682	AP00554092
AP00555180	AP00556494	AP00559437	AP00559542
AP00559786	AP00559885	AP00560159	AP00563373
AP00565380	AP00568111	AP00568488	AP00569135
AP00571974	AP00572416	AP00575360	AP00575649
AP00576370	AP00577259	AP00577679	AP00578149
AP00579437	AP00579891	AP00579947	AP00580822
AP00581103	AP00581526	AP00581530	AP00581836
AP00584588	AP00589565	AP00591931	AP00592891
AP00593327	AP00593940	AP00594449	AP00595527
AP00599454	AP00600795	AP00603078	AP00607366
AP00609226	AP00612935	AP00614613	AP00615582
AP00616199	AP00621252	AP00623779	AP00625916
AP00626351	AP00632879	AP00635850	AP00637176
AP00638174	AP00642648	AP00644085	AP00645165
AP00645647	AP00646991	AP00647442	AP00648545
AP00649378	AP00650310	AP00650954	AP00651914
AP00659387			

67.09.01	AP00535281		
AP00573624	AP00582494	AP00632032	AP00654699
AP00664996	AP00665209	AP00666152	AP00669741
AP00680261	AP00684211	**67.09.02**	AP00692452

67.09.03	AP00678584	AP00692452	AP00700736
AP00701055	AP00702253		

Upgrade Instructions SINUMERIK 840D
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