UPGRADE INSTRUCTIONS

Valid for

SINUMERIK 840D
Software release 07.04.39.00

1 Requirements for upgrade

Software version 07.04.39.00 (NCK 67.12.03) is a software update version.

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

1.1 System software 07.04.39.00 (NCK version 67.12.03)

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 permissible:
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 release V07.04.
- 6FC5250-6AY00-3AG0 (...-4AG0) SinuCom NC with SinuCom FFS **(** versions 7.1 / 7.2 are additionally available, version 7.3)
- 6FC5252-7AX21-4AG0 :Toolbox AB V 07.04.01 with PLC basic program 07.04.01
  the current toolbox is V 07.04.03
  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 only permits bus address 6)

2 Data backup

2.1 General requirements for upgrade

Before upgrading the NCK, ensure that at least 50 KB 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 50 KB of static memory should be available. This can be checked in 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 data backup, a PLC data backup must be created. This data 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 the Stop state.

  If you want to upgrade the basic PLC program you will need STEP 7. For this purpose, the new Toolbox 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 a new user program) because they have been modified by the machine manufacturer. After replacement of the NCK software transfer the modules to the PLC using STEP 7. A new PLC series startup file must be created.

- **Replacing the software**
  Switch the control off and replace the PC card. The card remains in the control.
  Set switch S3 to position 1 and switch S4 to position 3 and switch the control on. When it has powered up, the state "7-segment display shows digit 6 / PLC LED PS flashes / PF red" is established.
  The standard NC machine data have now been loaded. NC and PLC have been 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 data backups**
  Once the manufacturer password has been set, the NCK data backup can be loaded in the menu *Services/Series startup/Load startup archive/* after selecting the backup file.
  Once completed, the PLC data backup can be loaded.
  Once the PLC data backup has been loaded, you must switch the system off and on again so that all components are powered up simultaneously.

3 General notes

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 has not been released for applications in the machining process itself.
- Function G644 (smoothing with the maximum possible dynamic performance) has been released for applications in the tool change area (e.g. optimizations for approaching the tool change position).
  It has not been released for applications in the machining process itself.
- The functions FCUB and FLIN in combination with the compressor COMPCAD have not been released.
- Slave operation of PROFIBUS is not possible with NCU*.4. If such a configuration is required, it must be implemented with a CP module or an NCU *.5.

3.2 Frames

If $MC_MM_SYSTEM_FRAME_MASK bit 1 = 1, the external work offset is suppressed by G153. This represents a modified behavior when compared to other releases of software version 6.

The default setting of $MC_CHSFRAME_POWERON_MASK has changed. The standard value of MD24008 is now "zero" (previously "one"). This means that the system frame is kept for the scratching function, also beyond a power/on reset.

3.3 Series or upgrade archive

With a series or upgrade archive, it is possible to quickly and simply commission identical machines. These machines must be identical both regarding the electrical equipment (e.g. NCU, CPU, software) as well as regarding the mechanical conditions. If the electrical equipment and mechanical conditions do not match, then the series or upgrade archive is not necessarily a suitable commissioning technique. Another data backup technique must be used (e.g. separate data backup with Initial.ini etc.), as it is possible that machine data must be adapted.
It must be especially noted that the various NCUs have different memory limits. If these are fully utilized, then memory bottlenecks can occur when upgrading the NCK software or replacing an NCU.
Before generating data backups, machine data $MN_UPLOAD_MD_CHANGES_ONLY must be checked. It should be set to the value "0" or "FF"hex. Other values, for example "1", can result in problems after software has been upgraded when reading in the data backup. Preferably, value FFhex should be entered.

3.4 Limiting the number of axes and channels

From software release 6.5.10, the various software versions (2 axis..31 axis version) can be used on all NCUs, type ***.4** and type *.**5**.
As a consequence, PLC programs can be generated so that they can be used for various machine versions. Therefore, 6, 12, or 31 physical axes from 31 axes can be managed.
The number of axes and channels is limited as before.
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=channel, 2(31)=2 from 31 axes
*) from software release 07.02.12: 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 is still possible.

3.6 Alarm 14132 orientation axes incorrectly configured

This alarm is output for errors in the assignment between orientation axes and machine kinematics. However, this alarm is also output if no position measuring system is active for axes involved in the transformation.

3.7 Alarm 10752 overflow of the local block buffer for tool radius compensation

Increasing machine data $MC_CUTCOM_MAXNUM_DUMMY_BLOCKS=41 can prevent Alarm 10752 occurring.

3.8 Alarm 380001 Profibus DP: Power-up error, cause 1002 parameter 00

The alarm occurs after clearing the PLC with S4 in position 3. It should no longer occur after loading the PLC basic program.

3.9 Alarm 15150 subsequent loading from external was canceled

Increasing the value of machine data $MN_MM_EXT_PROG_BUFFER_SIZE can prevent the occurrence of Alarm 15150.

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 the spindle to the positioning mode.

3.11 NCU system resources

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

3.12 Series or upgrade archive with software release 7.4

Alarms can be output after reading in a series or upgrade archive.
From software release 07.04.07.00 and higher, the cycles for generic couplings are automatically loaded from the PC card into the NC CPU after a general reset. These cycles occupy dynamic memory space.
The settings for machine data 18170 $MN_MM_NUM_MAX_FUNC_NAMES and
18180 $MN_MM_NUM_MAX_FUNC_PARAM must, under certain circumstances, the redetermined.
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 release 7.4, is read back into an NCU that has been cleared, then the prompt can be output "Cycle nn already available ... overwrite ...".
This prompt can be negatively acknowledged.

3.13 Log file for Sinumerik 840D Version 07.04.39 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                      |
        |   07.04.39 840D 31A   E8ph_km                   |

        ------------------------------------------------.
PCM version: 02.18
-------------------------------------------------------------------------------------------
System                Versionstamp      Date   Checksum Linkdate/Time            Length     at
-------------------------------------------------------------------------------------------
Monitor Loader          67.12.03 24/01/12 240112 8A5300AC 24/01/12 21:29:52              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-FB15SI07.04.06  07.04.06*12/02/15 150212 0F35ADD4 15/02/12 14:18:46             00ADC0 02812C
PLC317-FB15 SI07.04.06  07.04.06*12/02/15 150212 4C5F1711 15/02/12 14:16:51             0082D8 032EEC
Monitor System          67.12.03 24/01/12 240112 509DCCF3 24/01/12 21:29:33             0040E0 03B1C4
Operating System        67.12.03 24/01/12|240112 D6D6896C 24/01/12 21:30:05             00BFB4 03F2A4
Numeric ContSI67.11.00  67.12.03 24/01/12|300112 2B4B923D 30/01/12 15:30:38             3C1640 04B258
VSA System  SI05.01.35  05.01.39 21/07/08 210708 280F3E32 21/07/08 13:03:02             03CA0C 40C898
VSA Data Description    05.01.39 21/07/08 030308 5BB209A7 03/03/08 15:11:56             004C90 4492A4
VSA Default Data        05.01.39 21/07/08 030308 848D5B51 03/03/08 15:11:56             000BB8 44DF34
Drive Version Info      05.01.39 21/07/08 190208 62F8CDFA 19/02/08 09:52:32             022648 44EAEC
HSA System  SI05.01.35  05.01.39 21/07/08 210708 7664FFF8 21/07/08 13:04:25             03CDB8 471134
HSA Data Description    05.01.39 21/07/08 030308 2305260D 03/03/08 15:11:56             005F10 4ADEEC
HSA Default Data        05.01.39 21/07/08 030308 FE9EC7B8 03/03/08 15:11:56             000E98 4B3DFC
SLM Data Description    05.01.39 21/07/08 030308 EA1DF0F1 03/03/08 15:11:56             004AD0 4B4C94
SLM Default Data        05.01.39 21/07/08 030308 BE7AF4AD 03/03/08 15:11:56             000BB8 4B9764
Inverter Codes          06.08.29 02/05/11  70411 C761EBB5  7/04/11 10:15:35 0010E8 4BA31C
VSA Motor Codes         06.08.29 02/05/11  70411 ACDF5549  7/04/11 10:15:36             0120E8 4BB404
HSA Motor Codes         06.08.29 02/05/11  70411 B6239D5A  7/04/11 10:15:35             006074 4CD4EC
SLM Motor Codes         06.08.29 02/05/11  70411 1F184813  7/04/11 10:15:36             004ACC 4D3560
VSA Inverter Data       06.08.29 02/05/11 180211 385A71E4 18/02/11 14:40:00             000518 4D802C
VSA Motor Data          06.08.29 02/05/11 180211 A691868A 18/02/11 14:40:07             012F4C 4D8544
HSA Inverter Data       06.08.29 02/05/11 180211 5762248E 18/02/11 14:40:03             0003A0 4EB490
HSA Motor Data          06.08.29 02/05/11 180211 1F26CEE4 18/02/11 14:40:10             0087F0 4EB830
SLM Motor Data          06.08.29 02/05/11 180211 2EB4E623 18/02/11 14:40:13             0033A0 4F4020
DriveSystem SI06.08.20  06.08.29 02/05/11 020511 82D5B0A9 02/05/11 09:59:35             062324 4F73C0
VSA-2 Data Description  06.08.29 02/05/11 020511 733CF4A6 02/05/11 09:59:27             00B590 5596E4
VSA-2 Default Data      06.08.29 02/05/11 020511 FD918379 02/05/11 09:59:28             0025CC 564C74
HSA-2 Data Description  06.08.29 02/05/11 020511 517204DE 02/05/11 09:59:27             00AC50 567240
HSA-2 Default Data      06.08.29 02/05/11 020511 BEBB3762 02/05/11 09:59:28             0025B4 571E90
SLM-2 Data Description  06.08.29 02/05/11 020511 838D61AF 02/05/11 09:59:27             00B450 574444
SLM-2 Default Data      06.08.29 02/05/11 020511 EA0D9F28 02/05/11 09:59:28             0025AC 57F894
HLA System              01.02.16 09/08/10 090810 E43646FE 09/08/10 09:20:46             0359C0 581E40
HLA Data Description    01.02.16 09/08/10 090810 921C71C3 09/08/10 09:21:14             003410 5B7800
HLA Default Data        01.02.16 09/08/10 090810 2FA0D51D 09/08/10 09:21:14             000D78 5BAC10
HLA Valve Data          01.02.16 09/08/10  90810 4E205233  9/08/10 09:28:43 001E68 5BB988
Driver Module           01.01.01 14.06.94  50899 B838268F  5/08/99 18:30:36  0000C4 5BD7F0
Serialnumber            01.01.01 24.01.95 221100 0327C431 22/11/00 11:27:40 0000D4 5BD8B4
Adaption Cycles         07.01.09 17/09/07 170907 79430E09 17/09/07 10:57:33             002E60 5BD988
Joblist for IBN         02.03.00 03/24/06 300112 62D553DF 30/01/12 15:31:17  00039C 5C07E8
Joblist for IBN/KOMP    02.03.00 03/24/06 300112 5D52131B 30/01/12 15:31:19             0003CC 5C0B84
Joblist for UPGRADE     02.03.00 03/24/06 300112 CB962241 30/01/12 15:31:21             0003B4 5C0F50
Link Loader             05.01.01 98/06/03 061098 F50A5D72 06/10/98 08:37:23  00029C 5C1304
Link Debugger Aequidis  05.03.01 00/11/28 281100 E5024825 28/11/00 13:42:35             0091AC 5C15A0
Link Software Aequid    05.02.05 02/01/07|070102 6083ACE7 07/01/02 11:05:01             008A8C 5CA74C
DP Software Aequid      01.00.06 02/08/13|130802 FCAE5BA2 13/08/02 10:36:01             01FC18 5D31D8
NCKS840d-31a10c          67.12.03 01/24/12 300112 A04AB0E5 30/01/12 15:31:11             0008D8 5F2DF0
NCKS840d-31a10c          67.12.03 01/24/12 300112 A04AB0ED 30/01/12 15:31:11             0008D8 5F36C8
NCKS840d-31a10c6         67.12.03 01/24/12 300112 202B84F9 30/01/12 15:31:12             000930 5F3FA0
NCKS840d-2a2c           67.12.03 01/24/12 300112 E7D65BF2 30/01/12 15:31:09             000DA8 5F48D0
-------------------------------------------------------------------------------------------
number of bytes: 0x005F5678   length of ABB file:   0x01000000
```

3.14 Machine control panel

The machine control panel is operated at MPI, OPI or via Profibus.

3.15 Contour handwheel

The contour handwheel function is now interlocked using an option.
If the function is selected via the VDI interface DB[channel].DBB30, without the option being set, then traveling through NC distances to go are not derived from the motion of the handwheel (as previously). Pending distances to go are traveled and Alarm "22400 Channel%1 Option contour handle not set" (cancel clear) is output.

3.16 Alarm 1000 system fault 100000

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

3.17 NC programs with active tool base orientation

NC programs with active tool base orientation and possibly in conjunction with the "tool carrier that can be orientated" function (swivel,, CYCLE800), must be run-in again.

4 Boundary conditions

4.1 PLC memory expansion for NCU *.4

Users are guaranteed 480kbytes of load memory. This limit can be exceeded, i.e. the existing memory can be utilized further. However, problems can then be encountered when reading in the series PLC commissioning files. Message: Memory full.

4.2 Help functions in the OB40

In the following combination, sporadically help functions are not identified in the PLC:
H/T function evaluation in OB40 (parameter IRAuxfuT/H =true of the FB1)
In the part program:
m=qu(55)
h2=33
The H function is sporadically lost.
Remedy: program m55.

4.3 Following error groups

When activating following error groups using synchronized actions or cross-channel, the user must ensure that the control parameters (e.g. acceleration, velocity) of the following axis are maintained. In these cases, no check is made in the NC.

4.4 NCU link

If NCUs are connected with one another via the Link function, then NCUs of the same type (MLFB) must always be used.

If a link connection is to be configured with different interpolation clock cycles, then the basic system clock cycles must be the same at both systems. Otherwise, Alarm 4013 is output with the fault identifier SYSCLOCK_SAMPLE_TIME_RATIO.

Exception:
It should be noted that for the NCUs, processes with different clock cycles are being used in the field. If, in the case of service, a module can only be replaced by a faster NCU, then the slower NCU must be the master. It is not absolutely necessary that all NCUs must be replaced.

4.5 Gantry axes

If, for a gantry group, the following axis rotates in the reverse direction (AX_MOT_DIR=1), then it is not permissible that the function generator (square wave) is used.

4.6 Loadable compile cycles

A maximum of 10 loadable compile cycles may be loaded. This also includes libraries with the file extension ???.ELF .

If more than one technological function is loaded, then incorrect value assignments can occur. This effect occurs if loadable compile cycle applications do not create their machine data continuously with ascending numbers within the three areas: NCK, channel and axis MD.
When loading a correct archive, it is possible that the content of individual CC machine data are mutually overwritten.

4.7 Alarm 4185

Help function assignments, that are neither effective nor have been rejected by an alarm, are now identified. Alarm 4185 is then output:

4.8 Program preprocessing

When using the program preprocessing function, after an upgrade to SW 6.4 Alarms 15170 "Program was not able to be compiled" and 15450 "Compiled program was not able to be saved" are output.
Cause:
With SW 6.4, the compilation is no longer saved in the SRAM, but in the DRAM.
However to do this, sufficient DRAM memory space must be reserved using MD $MN_MM_DRAM_FILE_MEM_SIZE.
However, the compilation can also be saved in the SRAM, if there is not sufficient DRAM memory. To do this, $MN_PREPROCESSING_LEVEL, bit 6 must be set.

4.9 PLC startup characteristic

- It is not permissible that NCU *.4 is operated with switch position 1 of S4. After a reset, or power off/on, the PLC does not go into cyclic operation.
- If the PLC has been put into the stop state by a PI service or by an operator action at the PG (e.g. when loading a hardware configuration), then this must be restarted again using the appropriate operator action at the PG or by using
switch S4. Power off/on or reset does not mean that the PLC resumes cyclic operation.

4.10 Alarm 380040 in software release 7.2.nn

If the alarm is output for Power Line, then an address conflict has occurred between the existing PLC I/O and the prepared machine data for Solution Line. In the case of a fault, an address must be allocated in machine data MD 13050 Drive Logic Address, which is not configured in the PLC.

4.11 Constant cutting rate

From NCK 67.03 and higher, the cutting rate is formed from the ENS position of the face axis (previously from the WCS positions).

5 Overview of new functions from software release 07.04.07.00 and higher

5.1 Couplings

With the introduction of generic couplings, users can select the necessary coupling properties for their applications. This is achieved using flexible programming. Subsequent use of other coupling properties is easily possible.

5.2 Output sequence of M functions after a block search can be specified.

The collected values of the M functions after a block search are available via system variables.
The sequence can be determined using a predefined procedure.

The correct sequence and where relevant the tool dependency can then be defined using an application in the ASUB after SSL. Today, the output of M functions with NC Start after SSL can be locked.

5.3 RTOB/BTOR conversion routines

Conversion routines rtob/btor to convert REAL<>BOOL have been introduced.

5.4 Safety

From release 7.4.6 and higher, the number of safety check sums has been extended:
MD_SAFE_DES_CHECKSUM[0] and [1] and MD_SAFE_ACT_CHECKSUM[0] and [1] are now available.
For 840D Power Line, the value is in the MD_SAFE_DES_CHECKSUM[1]=0.
Both checksums must be copied after an 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, which involves synchronized actions or synchronized action elements. Up to NCK release 62, the situation was that with option SI, synchronized action stage 2 was simultaneously set internally. This meant that channel MD 28250, NUM_SYNC_ELEMENTS to 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 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.
Further, checksums 36998[1]/36999[1] must be manually set to zero.

With system variable $AC_SAFE_SYNAC_MEM the relevant number of free SI synchronized action elements can be read.
If this variable is called before SAFE.SPF is started and run, the difference is the number of items that SAFE.SPF occupies. This difference should be entered in MD 28251 with a certain reserve value.

5.7 Tool manager edge location analysis

Edge locations of magazines can now be limited regarding the tool size.

5.8 ET200Pro-F I/O

ET200Pro-F I/O is now supported, and can also be used in conjunction with Safety Integrated.

5.9 DP/AS-I F-LINK

With software release 7.4.20, DP/AS-I F-LINK modules are supported. The prerequisite for this is the PLC operating system, version 20.70.31.

5.10 Machine data for individual version entry

Individual machine data sets (e.g. channel or axis machine data) can be allocated an individual identifier, which can also be identified again in the control system. To achieve this, machine data (which cannot be evaluated by the control system) are made available in the form of a character string; these can also be written via the commissioning archive and the standard user interface. The data entered by the user are displayed as supplementary 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] = machine type nn / ChanData Version V 1.0

5.11 Access to Profibus I/O from the NCK

The „NckProfibusCom“ functionality allows direct data exchange between the NCK and the Profibus I/O. Data can be exchanged via synchronized actions in the part program or compile cycles.

5.12 PLC changes from software 7.4

- When upgrading, blocks DB6, DB10, DB17, DB19, FC1, FC4, FC6, FC11, FC14, FB16, FB17, FB18, FB19 are eliminated. Data blocks DB10, DB17, DB19 are created as CPU-DBs. DB6 is eliminated completely.
- The interface bit "first cycle" is available in DB10.DBX104.6.

- The maximum number of PLC user alarms has been increased up to 32 groups.

5.13 Thermal motor protection (from drive V06.08.13)

The purpose of thermal motor protection is to protect the motor against continuous overload, and to prevent the motor temperature from exceeding the thermally permissible value.
With thermal motor protection (presented in simplified form), a model temperature of the motor is calculated internally in accordance with the motor type, the measured motor current, the KTY motor temperature sensor, if present, and the shutdown temperature threshold.
If the KTY motor temperature sensor is incorporated, the motor cannot be overloaded, even if it is started when warm.
The calculated model temperature refers to the permissible shutdown temperature of the motor from MD1607.
The actual thermal utilization of the motor is displayed as a percentage in MD1266.
If the thermal motor utilization exceeds a value of 100%, motor temperature alarm 300613 "Maximum permissible motor temperature exceeded" is output, and as response the following happens: DRIVE-READY and 611D ready are withdrawn (no difference to the previous alarm response).
Thermal motor protection is activated via MD 1265 “ACTIVITY_I2TMOT“ bit 0.
The motor monitoring type can be selected using MD 1265.BIT1:

Bit 1= 0 with evaluation of the KTY sensor
Bit 1= 1 pure current monitoring - no evaluation of the KTY sensor
The thermal motor protection is also not activated for a value of MD 1268 = 0 (winding time constant).

5.14 Second transverse axis in the channel

Also non-geo axes can be handled as transverse axis (i.e. programming and display in the diameter).

5.15 New machine data (drive) for evaluating the spindle power display

MD 1093[n]: Factor, spindle power display "LOAD_FACTOR" (dependent on the specific motor parameter set)
100.0000, Max = 200.0000, unit: [%]

5.16 Expansion of the master/slave function

From nck 67.11.00, it is possible to freely interconnected the equalization controller.

6 General notes on software upgrades

- Before the upgrade, series startup files and upgrade files must be created, which contain only those 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 are assigned the originally set values after a software update even in the case of different default settings through the individual 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 actual values that differ from their default values.

- 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 checksum". For this purpose, set machine data 11230 MD_FILE_STYLE bit 0 = 0.

- If the series startup 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 without line checksum is not possible (for example with a defective NCU), then a machine data file should be created with UPLOAD_MD_CHANGES_ONLY=FF after the upgrade, and the machine data it contains should be checked. In this case, especially the following data should be checked for 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 SinuComArc tool, 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 are often affected by manufacturer-specific applications, for example memory and time optimizations. In the event of problems, at least the default value 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 higher software version by **trained** service personnel. In this case, the following applies: From software release 3.7, the last released version of the software series should 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,
  - commissioning drives,
  - Commissioning the PLC

  and the availability of the necessary tools (e.g. SinuComArc, commissioning 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. In addition, the following data have to be checked for 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 SinuComArc tool, 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 are often affected by manufacturer-specific applications, for example memory and time optimizations. In the event of problems, at least the default value 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 SinuComArc tool. Check whether these data are included 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 start up. 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 might therefore be necessary to recommission the drives after an upgrade.

8 Functional improvements in further developments over 07.04.37.00

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