

NV RAM usage

FAQ No.0003

Part	Version	Revision	Date	Status
en	3.5.4.10	001	2019-01-01	Released

Content

Introduction	2
Option without dedicated NvRam hardware	2
Options with a dedicated NvRam hardware	2
Activating the necessary runtime component	
Known issues	
Implementation guideline for end-user NvRam usage	7
Disclaimer	

District Court Lemgo HRA 5649 DUNS-No. 314108728 VAT-No. DE309087075 Bank Details: Sparkasse Paderborn-Detmold IBAN DE 19 4765 0130 0000 0060 07 BIC WELADE3L General Partner: Vittorio Tavella KEB Verwaltungs-GmbH, Barntrup District Court: Lemgo HRB 8965 Directors: Curt Bauer CMO, Ralf Lutter COO, Vittorio Tavella CFO, Wolfgang Wiele CTO



Introduction

There are several possibilities existing in order to permanently store PLC runtime's data on a KEB IPC. The scope of this document is to make the end-user aware of the behaviour of the different solutions and their limits, restrictions and details.

Option without dedicated NvRam hardware

If no dedicated hardware is present (as systems with KEB part No. xxC6Ayy-zz**A**z), the build-in solution is, to store retain and persistent data on the CompactFlash storage. This is done, however, only, if the runtime is shut down properly, e.g. by using the sample given in the related sample project. On an unexpected power fail, the data will get lost. This may be an option in case the device is supplied by a second power supply and the mains availability is checked via a digital input.

Options with a dedicated NvRam hardware

There are two dedicated hardware solutions existing that offer the end-user a NvRam: The Can+NvRam board, provided with IPC systems with KEB part No. xxC6Ayy-zz**B** and the standalone NvRam board, provided with IPC systems with KEB part No. xxC6Ayy-zz**C**z.

Both boards need a suitable driver, which is preinstalled on the IPC system and a special component in the SoftPlc runtime that has to be enabled by the user.

Activating the necessary runtime component

For the latter, navigate to the runtime's installation folder (C:\Program Files\3S CoDeSys CoDeSys Control RTE3\) and use the correct .cfg file for your purpose. Therefore, delete the current CoDeSysControl.cfg file, copy the already present file with the 'NVR' tag in its filename (e.g. "Econ-SM-Can-NVR-CoDeSysControl.cfg") and rename the copied file back to CoDeSysControl.cfg by deleting the first part of the filename. You will then have to restart the runtime (or the complete system) to make these changes apply.

Known issues

When booting a system using a NvRam only extension board, you may face the situation that the system claims a driver for the extension card that is not present yet. In addition, you will see a message in the runtime's log (visible after connecting to the device using COMBIVIS studio 6) after activating the runtime component, like in the screenshot below:

U	16.01.2012 15:45:13:0	CH_INII done	CM
0	16.01.2012 15:45:13:0	NVR no hardware found!	CmpNVR
0	16.01.2012 15:45:13:0	NVR Non Volatile Ram component manager init	CmpNVR
0	16.01.2012 15:45:12:0	***************************************	CmpWebServer

In this case, you will need to update a set of files on your system. You can download the files from <u>ftp://ftp.keb.de/combivis6/PLC/NvRamUpdate.zip.</u> The archive's password is 'kebnvram'.

Extract the files and copy them to any usb mass storage and attach it to the target system.

You will find a file KEB_NVR_Pci.inf that you can use to install the driver from the windows hardware installation wizard when asked for a driver.

Therefore, please perform the following operations:



Found New Hardware Wizard	
	Welcome to the Found New Hardware Wizard Windows will search for current and updated software by looking on your computer, on the hardware installation CD, or on the Windows Update Web site (with your permission). Read our privacy policy
	Can Windows connect to Windows Update to search for software?
	 Yes, this time only Yes, now and every time I connect a device No, not this time Click Next to continue.
	LICK Next to continue.
	< Back Next > Cancel

In the installation wizard, select "No, not this time" and click next.



Answer the next question with "Install from a specific location" and click next.



Found New Hardware Wizard		
Please choose your search and installation options.		
Search for the best driver in these locations.		
Use the check boxes below to limit or expand the default search, which includes local paths and removable media. The best driver found will be installed.		
Search removable media (floppy, CD-ROM)		
Include this location in the search:		
C:\Documents and Settings\Administrator\Desktop\} Browse		
Oon't search. I will choose the driver to install.		
Choose this option to select the device driver from a list. Windows does not guarantee that the driver you choose will be the best match for your hardware.		
< Back Next > Cancel		

In the next dialog, choose "Don't search. I will choose the driver to install." and click next, until you are able to select a specific file like displayed below.

Hardware Update Wizard
Select the device driver you want to install for this hardware.
Select the manufacturer and model of your hardware device and then click Next. If you have a disk that contains the driver you want to install, click Have Disk.
Show compatible hardware
Model
This driver is digitally signed. Have Disk <u>Tell me why driver signing is important</u>
< Back Next > Cancel



Click on the "Have Disk..." button,

Found N	ew Hard	lware Wizard	
Sele	ct the d	levice driver you want to install for this hardware.	
II	nstall Fro	m Disk	×
Ma (St.		Insert the manufacturer's installation disk, and then make sure that the correct drive is selected below.	
(St (St (St		Copy manufacturer's files from: A:\ Browse	~
		s digitally signed. Have Disk. Udriver signing is important	
		< Back Next > Canc	el

and browse for the file 'KEB_NVR_Pci.inf' and open it by clicking "OK".

Found New Hardware Wizard
Select the device driver you want to install for this hardware.
Select the manufacturer and model of your hardware device and then click Next. If you have a disk that contains the driver you want to install, click Have Disk.
Model
RTIOwdmGeneric
This driver is digitally signed. Have Disk Tell me why driver signing is important
< Back Next > Cancel



Then, start the installation by clicking "Next" and close the dialog using the "Finish" button. The driver is the successfully installed.

As a second step, use the 'updateCmpNvr.bat' from the package to update the affected runtime component. Just execute it on the IPC system that is updated and reboot.

You should not see the above mentioned error anymore and the NvRam will work as expected. However, you will see a warning in the runtime's log at the first start, indicating that the "retain area changed or got corrupted". This is normal and indicates, that the new retain area is now accessible.



Implementation guideline for end-user NvRam usage

On using the IPC's non-volatile RAM in your PLC project, there is a key point the user needs to take care of during use: The NvRam is internally connected to the CPU using the PCI bus and the runtime will not optimize any access to the retain/persistent variables. Therefore, each (read or write) access to a retain or persistent variable will always result in a PCI bus telegram immediately. This may affect the general program's execution time as well as other PCI devices as there is no prioritization in any way existing on PCI level and therefore a lot of overhead might be generated.

Generally, the non-volatile Ram should be written at one single, defined position in the user code. This is most easily archived by defining a data structure for the retain and or persistent data. Any previously defined retain / persistent vars may be copied to the data structure. In the persistent vars definition, only on line remains in the definition, declaring one instance of the persistent data structure.



A second instance of the structure is used in the user's code.

The instance in the user's code is the 'working copy' of the persistent data and should be updated in a sensible cycle, depending on the application using a single codeline:

persistentData := UserBuffer;

All changes supposed to be stored in the persistent data should happen in the user buffer using

UserBuffer.Var1 := UserBuffer.Var1 + 1;

```
Remember to initialize the buffer on program start, like
// copy from NVRam only at the first cycle
IF NOT FirstCycle THEN
UserBuffer:=persistentData;
FirstCycle := TRUE;
END_IF
```

If any further optimization becomes necessary, it could be sensible to implement a check, whether an update of the non-volatile data is reasonable (because data has changed since the last uptade) or not.



Disclaimer

KEB Automation KG reserves the right to change/adapt specifications and technical data without prior notification. The safety and warning reference specified in this manual is not exhaustive. Although the manual and the information contained in it is made with care, KEB does not accept responsibility for misprint or other errors or resulting damages. The marks and product names are trademarks or registered trademarks of the respective title owners.

The information contained in the technical documentation, as well as any user-specific advice in verbal or in written form are made to the best of our knowledge and information about the application. However, they are considered for information only without responsibility. This also applies to any violation of industrial property rights of a third-party.

Inspection of our units in view of their suitability for the intended use must be done generally by the user. Inspections are particular necessary, if changes are executed, which serve for the further development or adaption of our products to the applications (hardware, software or download lists). Inspections must be repeated completely, even if only parts of hardware, software or download lists are modified.

Application and use of our units in the target products is outside of our control and therefore lies exclusively in the area of responsibility of the user.

> KEB Automation KG Südstraße 38 • D-32683 Barntrup fon: +49 5263 401-0 • fax: +49 5263 401-116 net: www.keb.de • mail: info@keb.de