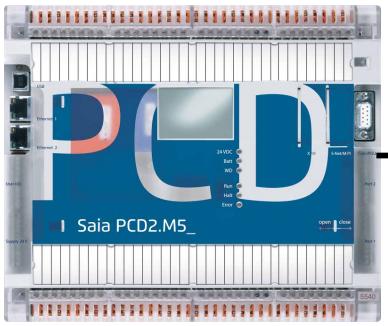
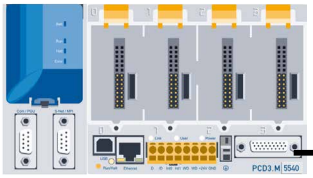
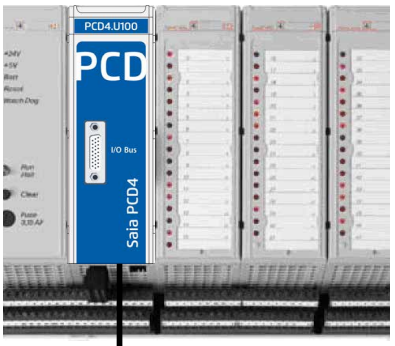
PCD2.M5xxx



PCD3.M5xxx





PCD4.U100 kit

PCD4.U100 kit

Document 26/888; Edition EN06 | 2013-10-08

0

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0

0.1 Document History

Date	Version	Changes	Remarks
2010-02-28	V1.00	-	Initial version
2010-04-16	V1.00	-	Using FBoxes
2010-05-25	V1.00	-	Minor corrections
2010-03-08	V1.01	-	Update
2010-09-28	EN01	-	Realisation in InDesign
2012-02-10	EN02	-	Supplemented with information for PCD4.N2x0
2012-03-01	EN03	-	Corrections
2012-10-16	EN04	-	5.2.2 Il-Code for time delay had been wrong
2012-10-17	EN05	-	Change of EN04 undone
2013-10-08	EN06	-	New logo and new company name

0.2 About this manual

See the section in the appendix in relation to some of the terms, abbreviations and the references used in this manual.

0.3 Brands and trademarks

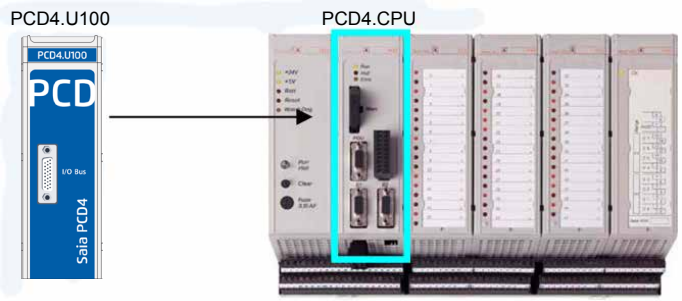
Saia PCD® and Saia PG5®
are registered trademarks of Saia-Burgess Controls AG.

Technical modifications are based on the current state-of-the-art technology.

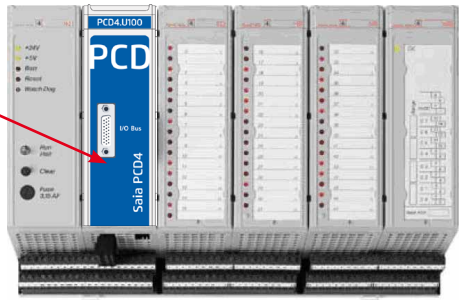
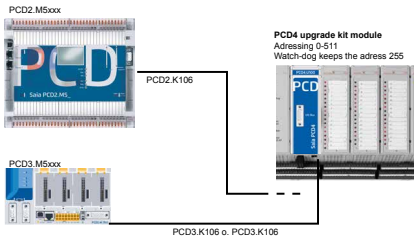
Published in Switzerland

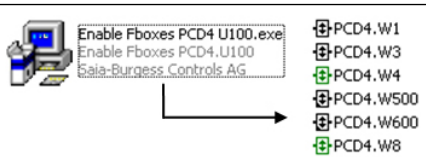
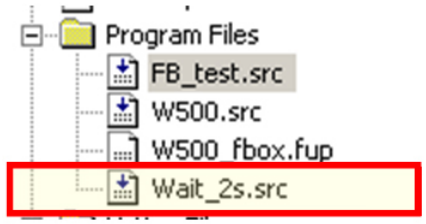
1 Migration Checklist

Recommended Method:
After checking if all PCD4 I/O Modules can be used for upgrade and if original project is available the mounting is quiet simple.
Replace the PCD4 CPU with a PCD4.U100, install a PCD3 or a PCD2.M5_ CPU with old PCD4 I/Os and eventually add new PCD2/3 I/O modules.



Update the user program to Saia PG5® 1.4.300 or Saia PG5® 2.0 and adapt the user program, download it and the system is ready.

1.	Remove PCD4 CPU The Power supply is still needed. Slot for PCD4 CPU.	
2.	Insert the PCD4.U100 module in the free slot.	
3.	Connect a PCD3 or a PCD2 system by using one of the following cable: • For PCD2.M5xxx use PCD2.K106 • For PCD3.Mxxxx use PCD3.K116 or PCD3.K106 Refer to chapter “Choosing address mode”	
4.	Chose address mode (also see chapter 2) • Keeping the addresses • No new PCD2/3 I/O modules Including all intelligent module like communication module PCD2/3.Fxxx(x) or memory modules like PCD2/3.R6xx(x) • Change address range • Use up to 8 new PCD3/PCD2 I/O modules	 Situated on the back of the PCD4.U100 module
5.	Install Saia PG5® 1.4.300 with Patch 15 or Saia PG5® 2.0.150 SP1, or higher.	

6.	Activating PCD4 FBox and FB's in Saia PG5® 2.0	
7.	Update project from old PG3 or PG4: First backup all project files. If the original project does not exist anymore it is not recommended to upgrade the application! When taking over existing user program code please remove all CPU specific functions. The new CPU will not be able to interpret these old functions	
8.	In the Saia PG5® 1.4 HW-Configurator or Saia PG5® 2.0 Device Configurator chose the used NT-OS CPU PCD2.M5_ or PCD3.M_.	
9.	Using Fupla programming with PCD4 I/O FBoxes After installing Saia PG5® 1.4.300 with Patch 15 or Saia PG5® 2.0.150 (SP1) open project and all FBoxes will be updated automatically.	
10.	IL programming using PCD4 FB's After installing Saia PG5® 1.4.300 with Patch 15 or Saia PG5® 2.0.150 (SP1) open project and all FB's will be updated automatically. If using IL without updated FB's: Due to the higher speed of the new Saia PCD®s a delay of 2s need to be added at system start up!	
11.	Now the user program can be finished and can be downloaded to the CPU.	

1.1 Compatibility list

PCD2.M5xxx	with NT OS (Minimum FW 1.10.16 or higher)
PCD3.Mxxxx	with NT OS (Minimum FW 1.10.16 or higher)
Power Supply Module PCD4.N2x0	Hardware version B or newer; The use of an older module can damage the PCD4.U100
Saia PG5® 1.4.300 Patch 15 or higher Saia PG5® 2.0.150 SP1 or higher	Do not use the media mapping of the Device-Configurator of Saia PG5® 2.0 for the configuration of the PCD4 I/Os. Please note that because of higher CPU speed, some NOP's instructions nee to be placed. (Refer to chapter 5.2)
Not Supported PCD4 I/O modules	PCD4.Hxxx (All PCD4.Hxxx modules are not supported)
Serial Interface	Only the serial interfaces on the new CPU are supported.

1.2 Documentation

This document
Manual PCD2.M5xxx with NT-OS - (SBC-NT)
Manual PCD3.Mxxxx with NT-OS - (SBC-NT)

2 Choose addressing mode

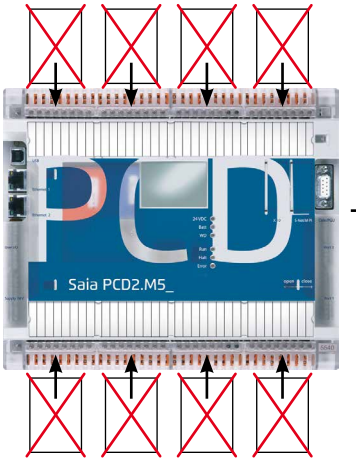
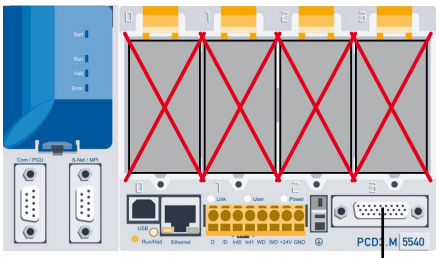
2.1 No changes using address ‘0’

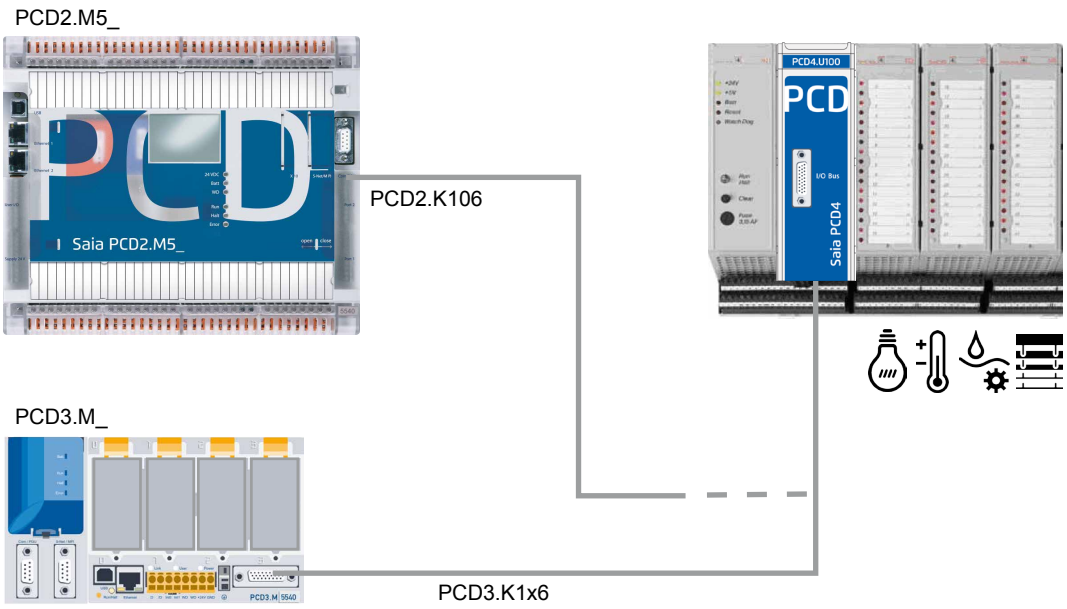
With this mode **no new I/O modules** can be used on the new PCD2/3 CPU platform.

The address 0 corresponds to the first slot on the PCD2/3 I/O bus and at the same time to the first PCD4 I/O slot.

→ So therefore it is not possible to use both an the same time.
The watch dog address stays at addresses 255 and 511 on PCD4. The watch dog on the new CPU is at address 255.

When using start address “0” for I/O modules do not use any new PCD2/3 I/O modules on the empty slots! Including all intelligent modules like communication modules PCD2/3.Fxxx(x) or memory modules like PCD2/3.R6xx(x)!

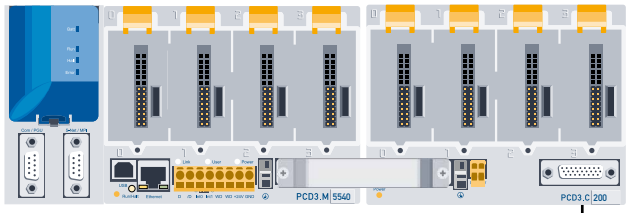
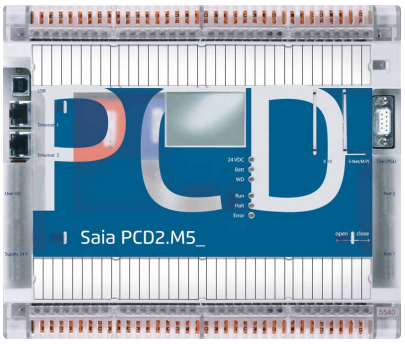
PCD2.M5xxx - with E-Display, Profibus or CAN	PCD3.Mxxxx
 To the PCD4.U100 Do not use any I/O modules on the slots 0 to 7	 To the PCD4.U100 Do not use any I/O modules on the slots 0 to 4

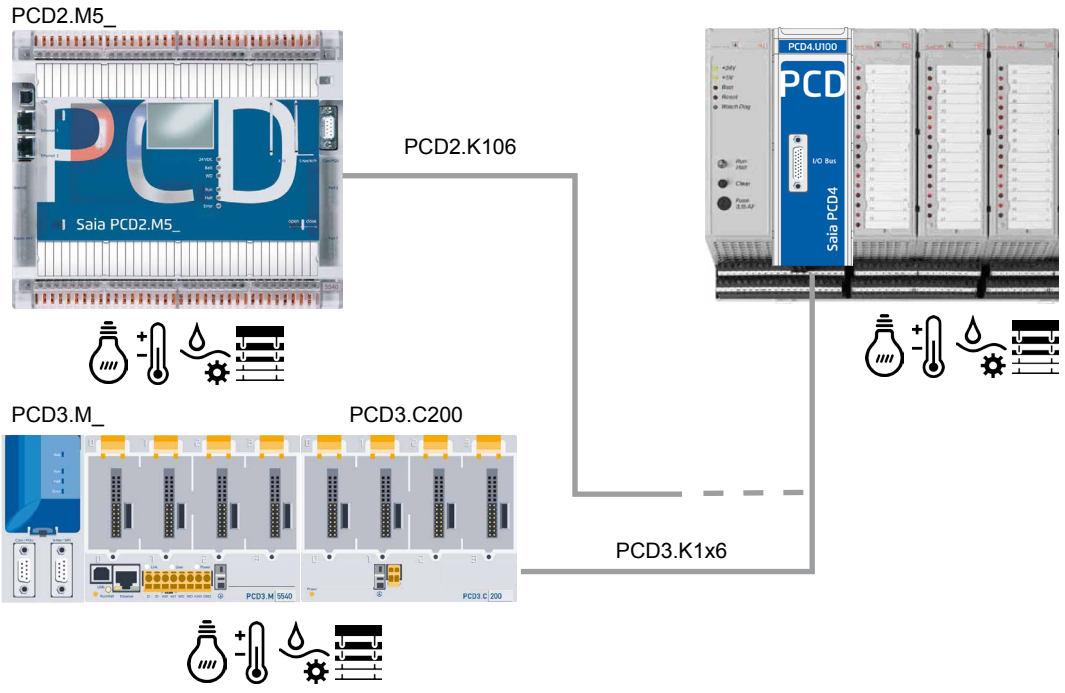


2.2 Using additional PCD2/3 IO modules

This mode allows using up to 8 new PCD2/3 I/O modules. All addresses for PCD4 I/Os needs to be incremented by 256. Including the ones of the PCD4 watchdog.

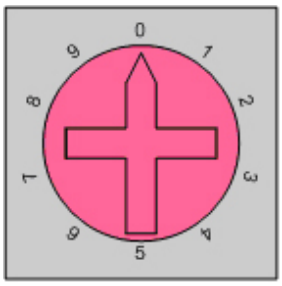
So there are two watch dogs at two different addresses. One on 255 available on new PCD2/3 and the other one at 511 and 767 for PCD4.

Using PCD3.Mxxxx	**PCD3.M5xxx** and **PCD3.C200** with max 8 I/O  max. 0-127 only with PCD3.K010 To the PCD4.U100
Using PCD2.M5xxx	**PCD2.M5xxx** with max 8 I/O units  To the PCD4.U100 max. 0…127



2.3 Switch for addressing mode

The switch is situated on the back side of the PCD4 module

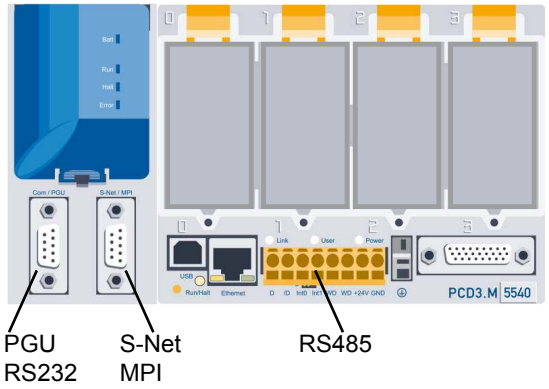
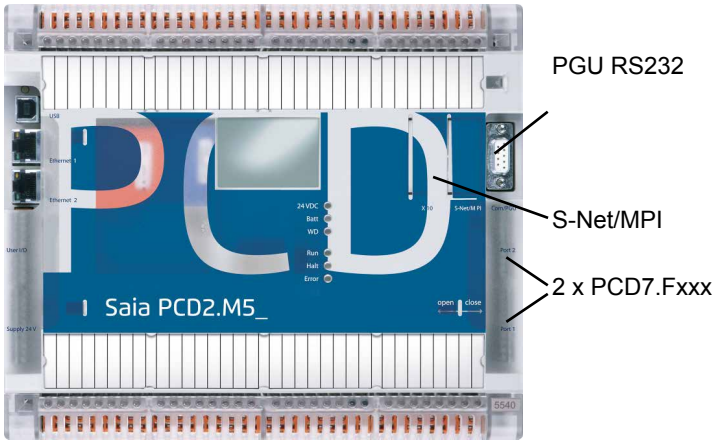


	Start address for PCD4 I/O modules	
Pos. 0	0	To use with a PCD2.M5xxx without PCD2.Cxxxx extension and without any PCD2 I/O, PCD2.F2xxx or PCD3.R6xxx modules! Option: PCD3.Mxxxx with PCD3.Cxxx extension but without any I/O module!
Pos. 1	0	To use with a PCD3.M3xxx without PCD3.Cxxx extension and without any PCD3 I/O, PCD3.Fxxx or PCD3.R6xx modules! Note: Do not use any PCD2.M5 CPU on this position!
Pos. 2	256	PCD3.Mxxxx with PCD3.Cxxx extension PCD2.M5xxx without extension Use up to 8 PCD2/3 I/O modules on the free slots. But adapt user program to new addresses.
Pos. 3	256	PCD3.Mxxxx without an extension module Use up to 4 PCD3 I/O modules on the free slots. But adapt user program to new addresses.

3 Serial communication

Note:
The serial ports on PCD4 CPU need to be replaced by new ports.

When using the onboard serial ports and no PCD2/3 E/A module is used, the address range of the PCD4 I/O begins at the address 0.

Using PCD3 System: Maximum 3 serial on board ports on PCD3	
Using PCD2.M5_ system: Maximum 4 on board serial ports on PCD2	

When using PCD3.Fxxx or PCD2.Fxxxx communication modules the I/O address range will begin at 256. This means the user program needs to be adapted to the new address range.

4 Differences to old systems

4.1 Functions on PCD4.N210

LED name	LED description	Picture
+24V and +5V	Bus signals	
Reset	Signals e.g Restart Cold function	
Watch Dog	Watch Dog	
The following LEDs and buttons have no functionality any more: ■ Battery ■ RUN/HALT ■ CLEAR		

4.2 XOB 5

On new CPUs the signal /IOQUIT does not exist anymore. This means the exceptions XOB5 not valid anymore. In the user program XOB5 should be marked as comment.

4.3 XOB 1

The exception routine XOB1 detects failures on the I/O bus power of the PCD4 or when using the PCD3.C200 extension. The time before the CPU detects the failure is around 500 ms.

With PCD4.N200

The +5V and the entry tension are supervised. A failure on the +/- 15V is not detected.

With PCD4.N210

Supervision of the 3 output tension +5V and +/- 15V including the input tension.

5 User program

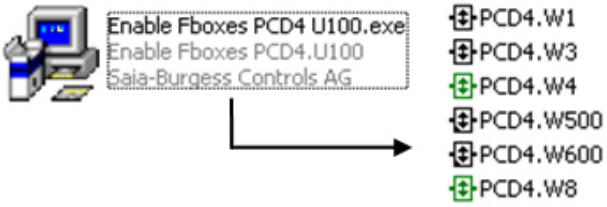
5.1 Programming with Fupla

With Saia PG5® 2.0.150 SP1 or 1.4.300 with Patch 15 or later versions it is possible to work with PCD4 I/O modules by using standard Saia PG5® FBoxes libraries “Analogue Module” and “HVC-Analogue”. When using the PCD4.U100 module it is important to use the updated FBoxes!

Using Saia PG5® 1.4
With the version 1.4.300 and patch 15 the PCD4 I/O FBoxes are ready to use with the new PCD4.U100 module:
• Analogue Module SP2.6.150 or higher
• HVC-Analogue $2.5.316 or higher

Using Saia PG5® 2.0
To use the PCD4 I/O Fboxes you need to install Saia PG5® 2.0.150 SP1 and to enable PCD4 I/O
FBoxes or FBs in Saia PG5® 2.0:
• Analogue Module SP2.6.150 or higher
• HVC-Analogue SP2.6.150 or higher

Run the activating tool to use standard or HEAVC I/O FBoxes in Saia PG5® 2.0.150: (download from www.sbc-support.com)



5.2 Programming with IL

5.2.1 IL programming using PCD4 FB’s

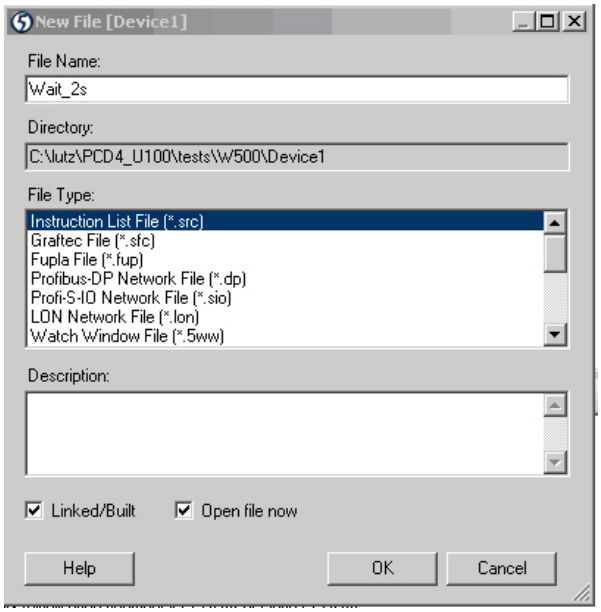
After installing Saia PG5® 1.4.300 with Patch 15 or Saia PG5® 2.0.150 (SP1) open project and all FB’s will be updated automatically.
→ See chapter 5.1 for activating the PCD4 I/O FB’s on Saia PG5® 2.0.150

5.2.2 If using IL without updated FB’s:

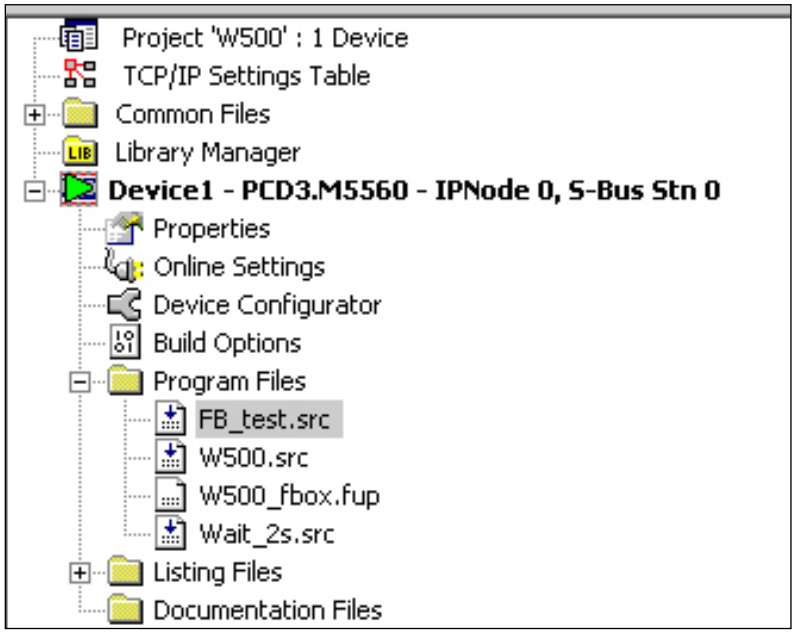
Due to the higher speed of the new PCDs a delay of 2s need to be added at system start up!
Initialisation of the 2s delay:
To ensure the correct start up of the PCD4 I/O modules connected to new PCDs with NT-OS firmware a time delay needs to be added at power up of the system.
This can be realised by adding a *.src file with following IL instruction ad linking this file at the very beginning of the link order.

Note:
This 2s time delay at start up of the system is absolutely necessary!

Creating *.src for time delay:



This creates a new file Wait_2s.src.

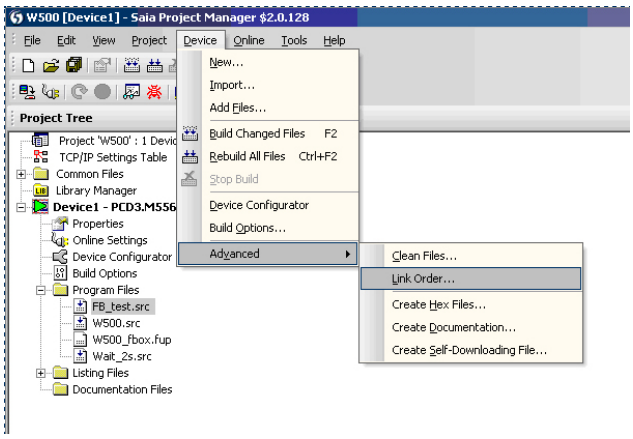


Open this file and add the following code lines:

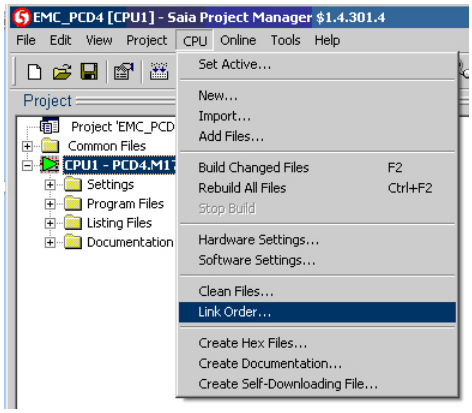
```
$INIT
        ACC   H
        LD    T 0
              T#2s      ; right T#2s = 2 seconds
                        ; wrong 20 = 20 time units

LOOP:   STH   T 0
        JR    H LOOP
        ACC   H

$ENDINIT
```

Change the linking order, the new file Wait_2s.src needs to be placed at the very beginning.

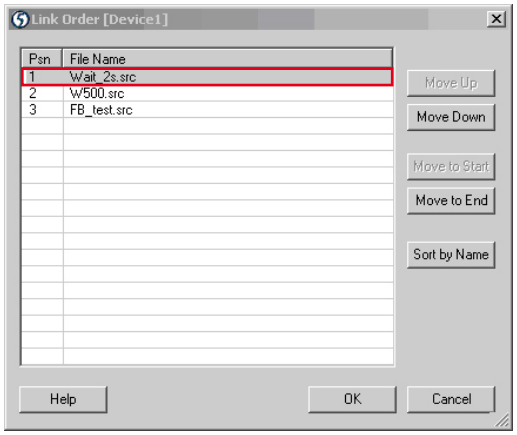
Open Link order menu for Saia PG5® 2.0:



Open Link order menu for Saia PG5® 1.4:



The following window will appear:



The file Wait_2s.src needs to be placed at the beginning of the link order!

With this operations a waiting time of 2s will be effectuated at every start up and cold start of the PCD system. This time delay enables the PCD4 I/O modules to be initialised in a correct way.

5.2.3 IL adaptations for PCD4.W100 modules

Because of higher speed of new CPUs some NOP instructions needs to be placed:

Read/write

```
                (ACC H ) (accu must be 1)
        SET     O 2 *)      ; select input channel I2
        NOP
        RES **) O 8 *)      ;
        SET     O 8 *)      ; start A/D conversion
        RES     O 8 *)      ;
        STH     I 15 *)     ; high = conversion in progress 30 µs
        JR      H -1        ; (wait or branch until is complete)
                ------------------
        BITI    12          ; read A/D value, 12 bits
                I 0 *)      ; from address 0 (LSB)
                R 102       ; into Register R102
                ------------------

        NOP
        NOP
        NOP
        NOP

        BITO    12          ; output 12 bits
                R 113       ; from Register R113
                O 0 *)      ; to address 0 (LSB)
                ------------------
                (ACC H )    ;(accu must be 1)
        SET     O 13 *)     ; select output channel O13
        RES     O 13 *)     ; and start D/A conversion
```

Read/write

```
        BITO    12          ; output 12 bits
                R 113       ; from Register R113
                O 0 *)      ; to address 0 (LSB)
                ------------------
                (ACC H )    ;(accu must be 1)
        SET     O 13 *)     ; select output channel O13
        RES     O 13 *)     ; and start D/A conversion

        NOP
        NOP
        NOP

                (ACC H ) (accu doit être 1)
        SET     O 2 *)      ; select input channel I2
        NOP
        RES **) O 8 *)      ;
        SET     O 8 *)      ; start A/D conversion
        RES     O 8 *)      ;
        STH     I 15 *)     ; high = conversion in progress 30 µs
        JR      H -1        ; (wait or branch until is complete)
                ------------------
        BITI    12          ; read A/D value, 12 bits
                I 0 *)      ; from address 0 (LSB)
                R 102       ; into Register R102
                ------------------
```

*) add base address of the module to its operands.

5.2.4 IL adaptations for PCD4.W300 Modules

The code doesn't need any adaptations.

5.2.5 IL adaptations for PCD4.W400 Modules

The code doesn't need any adaptations.

5.2.6 IL adaptations for PCD4.W500 Module

For proper initialisation of these modules, please proceed as follow:


```
XOB       16
CFB       Control
          BAW500_0  ; Module base address
          7         ; Restart warm

CFB       config    ; Generally the config command is called
                    ; for an initialization at powerup
          BAW500_0  ; Module base address
          W5Conf_0  ; Con·guration bloc DB


          .         ; User programm
          .         ;
          .         ;
EXOB
```

5.2.7 IL adaptations for PCD4.W600 Module

For proper initialisation of these modules, please proceed as follow:

```
XOB       16
CFB       Control
          BAW600_0    ; Module base address
          7         ; Restart warm

CFB       config    ; Generally the config command is called
                    ; for an initialization at powerup
          BAW600_0  ; Module base address
          W6Conf_0  ; Con·guration bloc DB


.                   ; User programm
.                   ;
.                   ;

EXOB
```

5.2.8 Multiples use W500 and/or W600

In the case where more than one W500 and/or W600 is used the following recommandations need to be followed in order not to have too high initialisation times.
The time for initialisation will not be higher than 3s in comparison to old PCD4 modules.

```
        XOB     16

        CFB     Control
                BAW500_0    ; Base address of the ·rst W500 modul
                7           ; Restart warm

                .           ; Others W500
                .

                CFB  Control
                BAW500_n    ; Base address of the last W500 modul
                7           ; Restart warm

        CFB     Control
                BAW600_0    ; Base address of the ·srt W600 modul
                7           ; Restart warm

                .           ; Others W600
                .

        CFB     Control
                BAW600_n    ; Base address of the last W600 modul
                7           ; Restart warm
-------------------------------------------------------------------
All modules are now restarted
All the Config Functions can follow
-------------------------------------------------------------------
        CFB     config
                BAW500_0    ; Module base address
                W5Conf_0    ; Configuration bloc DB

                .           ; Others W500
                .

        CFB     config
                BAW500_n    ; Module base address
                W5Conf_n    ; Configuration bloc DB

        CFB     config
                BAW600_0    ; Module base address
                W6Conf_0    ; Configuration bloc DB

                .           ; Others 6500
                .

        CFB     config
                BAW600_n    ; Module base address
                W6Conf_n    ; Configuration bloc DB
```

5.2.9 Not supported modules

Please note that all PCD4.H_ modules are not supported.

A Appendix

A.1 Icons

	In manuals, this symbol refers the reader to further information in this manual or other manuals or technical information documents. As a rule there is no direct link to such documents.
	This symbol warns the reader of the risk to components from electrostatic discharges caused by touch. Reco mmendation : at least touch the Minus of the system (cabinet of PGU connector) before coming in contact with the electronic parts. Better is to use a grounding wrist strap with its cable attached to the Minus of the system.
	This sign accompanies instructions that must always be followed.
	Explanations beside this sign are valid only for the Saia PCD® Classic series
	Explanations beside this sign are valid only for the Saia PCD® xx7 series.

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A.2 Contact

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