ThinkIO™ - P

Premium DIN Rail PC
for Fieldbus and IO Systems

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PROGRAMMING ASSISTANCE GUIDE

-

FIELDBUSSES

The product described in this manual is in compliance with all applied CE standards.

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1. Using the Fieldbus Interface on the ThinkIO-P

The following is a brief introduction on how to set up the Fieldbus interface on the ThinkIO-P for operation.

1.1 Installation of the Communication Interface (CIF) Driver

The CIF driver itself is a Linux kernel driver of which there are two versions: **`cif_thinkiop.ko`** for the 2.6 kernel, and **`cif_thinkiop.o`** for the 2.4 kernel. This driver is normally loaded into the kernel automatically on system start. If for any reason the driver is not loaded automatically, enter the following if the module resides in the lib folder:

```
modprobe cif_thinkiop.ko
```

or enter:

```
insmod cif_thinkiop.ko
```

which will load the driver manually.

In the event the driver has been loaded automatically, no further action is required. If, however, the driver was installed manually, it is necessary to create a device node using the following command:

```
mknod –m 644 /dev/cif c xxx 0
```

where xxx stands for the registered major number assigned dynamically when loading the driver. On a non-modified ThinkIO-P it is normally 253 for the kernel 2.6.x and 254 on a kernel 2.4.x.

1.2 Verify the Driver

The driver installation can be verified using the following command:

```
cat /proc/devices
```

which will result in the following line being displayed in the “Character devices” section:

```
xxx cif
```

where xxx stands for the registered major number, e.g. 253.

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2. Starting the TCP/IP Server

The second part of the Fieldbus driver package is the TCP/IP server. This is needed for configuring the Fieldbus with the Windows application “SyCon” from a remote Windows PC. This is the easiest and fastest way to configure a Fieldbus.

Normally the TCP/IP server is installed automatically during the system start, but, if required, it can also be installed manually with following command:

```
srvTCPIP &
```

It must be ensured that only one TCP/IP server is in operation, otherwise unpredictable results can occur. To determine that this is the case enter:

```
ps –A
```

and verify that the process: **`/bin/srvTCPIP`** is running.

3. Fieldbus Configuration Tool “SyCon”

3.1 Installation

ThinkIO-Ps with a Fieldbus interface are delivered with a CD containing the Fieldbus manuals and the SyCon configuration tool.

Insert the CD in the local CD ROM drive. The installation program will normally start by itself (Autostart enabled). If it doesn’t, change to the root directory on the CD and start the “Autorun.exe” (Autostart disabled). Administrator privileges are required on Windows NT/2000/XP systems for installation.

The installation program requests the components to be installed. Answer these questions with Yes or No.

This should be selected:

- System Configurator SyCon (configuration and diagnostic tool)

This should **NOT** be selected:

- OPC server (for OPC communication)
- CIF device driver (device driver for access to the CIF with Windows)

If the license code is available, then answer the question for an existing license code with yes, otherwise a basic version of the System Configurator will be installed. Enter your name and the company name.

The following three Fieldbus options for the ThinkIO-P should be selected afterwards:

- CANopen
- DeviceNet
- PROFIBUS

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3.2 Brief Description of SyCon

SyCon is a **Sy**stem **Con**figuration tool which allows the user to configure a Fieldbus network with several devices which can either be slaves or masters. As a master must know with which slaves it should communicate, a configuration tool is necessary. The Hilscher SyCon is an such a tool which is able to configure the various possible Fieldbus types using the same user interface.

The SyCon is project oriented which means that everytime it is necessary to install a new Fieldbus network, a new project must be initiated using the menu: “File -> New”, where SyCon then asks for the Fieldbus type.

After that, normally the user inserts all the Fieldbus devices to the network overview in SyCon, beginning with the Masters and continuing with the Slaves.

Examples on how to configure a Fieldbus can be found in the online help menu or in the manual provided on the CD.

3.3 Description Files for SyCon (GSD, EDS)

3.3.1 GSD Files for Profibus

GSD (electronic data sheet of a device) files contain and describe the functions and characteristics of PROFIBUS devices. The abbreviation GSD means 'Geraetestammdaten' (Device Base Files). All of the available GSD files together form the device database.

When the program is started, the system configurator automatically retrieves all the GSD files stored in the GSD directory. The device names are placed in an internal list. During the configuration the device-specific data is retrieved directly from the GSD files.

If a PROFIBUS DP Slave device does not appear in the selection list, a corresponding GSD file can be copied into the GSD directory with: **`File > Copy GSD`**. Another possibility is to copy the GSD file into the SyCon GSD directory with the Windows Explorer and then retrieve the GSD files into the GSD directory with: **`Settings > Path`** and then: **`OK`**.

The GSD files can be viewed with the: **`Tools > GSD Viewer`** menu.

- ThinkIO-P Profibus Master

  The GSD file **`Ec1dpm.gsd`** from Hilscher must be used. It can be found in:

  `C:\Programme\Hilscher\SyCon\Fieldbus\PROFIBUS\GSD`

  This will change later when the ThinkIO-P has been certified by the PNO and a new Ident Number has been issued. It is important to read the **`README`** file in the **`GSD_ESD`** folder of the ThinkIO-P BSP which describes what GSD File must be used.

- ThinkIO-P Profibus Slave

  The GSD file **`HIL_06E7.GSD`** from Hilscher must be used. It can be found in:

  `C:\Programme\Hilscher\SyCon\Fieldbus\PROFIBUS\GSD`

  This will change later when the ThinkIO-P has been certified by the PNO and a new Ident Number has been issued. It is important to read the **`README`** file in the **`GSD_ESD`** folder of the ThinkIO-P BSP which describes what GSD File must be used.

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The GSD files of other vendors are available on the PROFIBUS user organisation home page: http://www.profibus.com.

3.3.2 EDS Files for CANopen and DeviceNet

The EDS files are similar to the GSD files and are used for CANopen Slaves. To use the ThinkIO-P as a CANopen Slave interface together with SyCon, the following EDS file must be used: **`Ec1cos.eds`**. This file can be found in:

`C:\Programme\Hilscher\SyCon\Fieldbus\CANopen\EDS`

This will change later when the ThinkIO-P has been certified by the CIA and a new Ident Number has been issued. It is important to read the `README` file in the **`GSD_ESD`** folder of the ThinkIO-P BSP which describes what ESD File must be used.

3.4 Further Documentation

The user manual for SyCon can be found on the CD in the following folders depending on the Fieldbus type.

- Profibus: **`D:\MANUALS\<language>\PROFIBUS\ pb_oi*.pdf`**
- CANopen: **`D:\MANUALS\<language>\CANOPEN\CO_OI*.PDF`**
- Devicenet: **`D:\MANUALS\<language>\Devnet\Dn_oi*.pdf`**

`<language>` can be the preferred language, e. g. Deutsch, Francais, English

`*` depends on the desired language and can be “d” for German, “f” for French or “e” for English

4. Programming the Fieldbus Interface

4.1 The CIF API

The idea of the dual-port memory interface is to have an unique interface for all the different devices handling different protocols. Therefore the dual-port memory has a static basic layout whereby the procedure for handling the user data is always the same. Of further assistance are the demo applications provided on the CD.

4.2 Fieldbus Node ID

Normally the fieldbus node ID is set using the SyCon configurator. This ID is permanently stored, and, when the ThinkIO-P is powered up, it is used as the default ID for the fieldbus. During operation it remains as the fieldlbus ID unless it is explicitly altered. If during operation the node ID is altered, the “new” node ID is lost upon power down unless it has been set using the SyCon configurator.

In addition, the ThinkIO-P provides via the BIOS setting KOM Feature: “Set ThinkIO Node ID” the possibility for applications to have access to a separate node ID if required. This feature can only be accessed from within an application via the operating system.

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4.3 The Demo Applications

The demo applications which show the principles of using the CIF API can be found in the BSP directory:

for kernel 2.6:

/opt/linux_swp_kom/thinkiop/CONFIGFS/src/hilscher/cif-v2.601/console

for kernel 2.4:

/opt/linux_swp_kom/thinkiop/CONFIGFS/src/hilscher/cif-v2.100/console

4.4 Further Documentation

The CIF API description can be found also in the BSP directory:

for kernel 2.6:

/opt/linux_swp_kom/thinkiop/CONFIGFS/src/hilscher/cif-v2.601/man/cif_drv.pdf

for kernel 2.4:

/opt/linux_swp_kom/thinkiop/CONFIGFS/src/hilscher/cif-v2.100/man/cif_drv.pdf

5. Troubleshooting

5.1 LED Diagnostics

The operational status of the ThinkIO-P can be monitored via the front panel LEDs.

The yellow RDY LED lights continously after the operating system itself has initialized without an error and no hardware defect has determined.

The green RUN LED blinks cyclic if: 1) the firmware protocol tasks haven't been started, 2) a hardware error has not occurred, or 3) a configuration error has not occurred. In this case the tasks are ready to start the communication. This LED lights continously if the device has a data exchange communication with at least one projected slave participant.

The red ERR LED lights continuously if a bus error has occurred. This can happen, for example, if a projected slave can't be found on the bus.

The yellow STA LED represents the hold-token of the master. As long as the device doesn't recognize any other master system on the bus, the device retains the right to send. Therefore the STA LED lights continuously.

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