ibaFOB-TDCexp

Interface Card for SIMATIC TDC

Manual

Issue 1.2

Measurement and Automation Systems

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The content of this publication has been checked for compliance with the described hardware and software. Nevertheless, deviations cannot be excluded completely so that the full compliance is not guaranteed. However, the information in this publication is updated regularly. Required corrections are contained in the following regulations or can be downloaded on the Internet.

The current version is available for download on our web site http://www.iba-ag.com.

Protection note

Windows® is a label and registered trademark of the Microsoft Corporation. Other product and company names mentioned in this manual can be labels or registered trademarks of the corresponding owners.

Certification

The device is certified according to the European standards and directives. This device corresponds to the general safety and health requirements. Further international customary standards and directives have been observed.

Version	Date	Revision	Chapter / pages	Author	Version HW/FW
V 1.2	06/13/17	Configuration of cycle times	Chapter 11.1	ko/ip	

Table of contents

1   About this manual

This manual describes in detail the configuration and use of the product ibaFOB-TDCexp. It serves both as a tutorial and a reference document.

1.1   Target group

This manual addresses in particular the qualified professionals who are familiar with handling electrical and electronic modules as well as communication and measurement technology. A person is regarded to as professional if he/she is capable of assessing safety and recognizing possible consequences and risks on the basis of his/her specialist training, knowledge and experience and knowledge of the standard regulations.

1.2   Notations

In this manual the following notations are used:

Action	Notation
Menu command	Menu „Logic diagram"
Call of menu command	„Step 1 – Step 2 – Step 3 – Step x" Example: Select menu „Logic diagram – Add – New logic diagram "
Keys	<Key name> Example: <Alt>; <F1>
Press keys simultaneously	<Key name> + <Key name> Example: <Alt> + <Ctrl>
Buttons	<Button name> Example: <OK>; <Cancel>
File names, Paths	„File name", „Path" Example: „Test.doc"

1.3   Symbols used

If safety instructions or other information are used in this manual, they mean:

⚠ DANGER

The non-observance of this safety information may result in an imminent risk of death or severe injury:

- By an electric shock!

- Due to the improper handling of iba software products which are coupled to input and output procedures with control function!

⚠ WARNING

The non-observance of this safety information may result in a potential risk of death or severe injury!

⚠ CAUTION

The non-observance of this safety information may result in a potential risk of injury or material damage!

Note

A note indicates special requirements or actions to be observed.

Important information

Information that a special indication has to be observed, e.g. exceptions from the general rule.

Tip

Tip or example which serves as helpful information or a trick to facilitate the work.

Other documentation

Reference to supplementary documentation or further literature.

2   Scope of delivery

The following components are included with the delivery.

❑ ibaFOB-TDCexp card

❑ Manual

❑ Synchronization cable (sync cable)

↗ For more accessories not included in delivery, please see www.iba-ag.com.

3   Safety information

Please consider the following safety advises:

⚠ DANGER

To prevent electrical shock during installation or uninstallation of the device disconnect the power supply from the computer before opening!

⚠ CAUTION

This card contains components which can be destroyed by electrostatic discharge. Prior to touching any electronics card, your body must be electrically discharged. This can be simply done by touching a conductive, grounded object immediately beforehand (e.g. bare metal cabinet components, socket protective conductor contact).

4   System requirements

4.1   Hardware

IBM PC-compatible computer with the following minimum configuration:

❑ Pentium IV/3 GHz

❑ At least one free PCIe 1.0-x1 compatible slot

❑ 512 MB RAM

❑ Free disk space > 10 Gbyte

↗ For more information about iba PC, please see www.iba-ag.com.

4.2   Software

❑ ibaPDA Version V6.32.0 or higher

5   Introduction

5.1   Application

The ibaFOB-TDCexp card couples the iba Process Data Acquisition system ibaPDA with the Siemens control system SIMATIC TDC. To achieve this, the ibaFOB-TDCexp card must be connected to one of the free ports of the CP52IO (GDM Interface Module of the SIMATIC TDC).

The CP52IO realizes the access to the GDM memory card CP52M0. Using a fiber optic link the TDC racks are connected to the CP52IO via the CP52A0 card. Up to 44 TDC racks can be connected to the GDM in total. For the TDC system, the ibaPDA PC with an ibaFOB-TDCexp card acts like a TDC rack, the ibaFOB-TDCexp card acts like a CP52A0 card.

This topology enables the ibaPDA system with an ibaFOB-TDCexp card to communicate notionally with every processor in one of the connected TDC racks (max. 43).
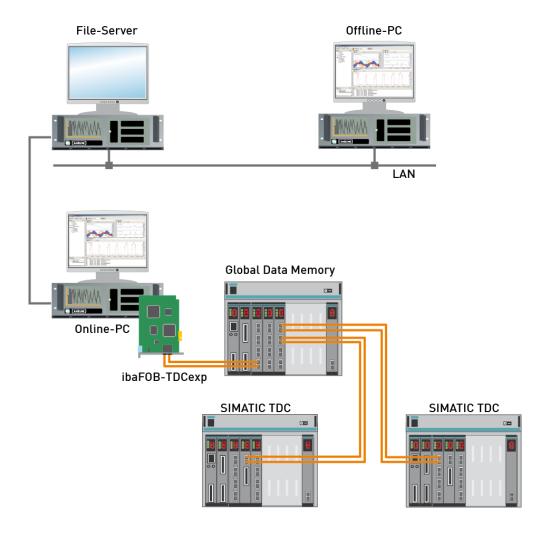

Figure 1:   Typical topology with ibaPDA

5.2   Characteristics

The card has the following characteristics:

❑   PCI Express card for 1.0-x1 compatible slot

❑   100 % functional compatible with the predecessor ibaFOB-TDC

❑   Firmware update without dismounting the card

❑   Bidirectional fiber optic link with 640 Mbit/s

❑   Absolutely noise free acquisition of process data

❑   Enhanced SIMATIC TDC system diagnostics

❑   Display for card id, processor and link status via 7-segment display and LEDs

❑   Up to 4 PCIe cards per PC

❑   Plug and play installation

❑   All component parameters are 100% controlled by software. No wiring or jumpering
    is necessary for that card.

5.3   Operational modes

To measure SIMATIC TDC system numeric and binary values must be transported be-
tween the TDC system and the PC, which means that internal variables of the TDC sys-
tem may be visualized and recorded. For recording purposes two different software pack-
ages are supported by the ibaFOB-TDCexp card:

❑   SD-TDC-lite:
    All values to be measured by ibaPDA have to be manually programmed in CFC
    charts of the control unit. Changes of signals require a change in this chart. Up to
    16 process telegrams are to be defined per card which transport the values to
    ibaPDA containing 32 analog plus 32 digital variables each. Structure and length of
    the process telegrams are determined by ibaPDA. Up to 4 cards in a PC are sup-
    ported by ibaPDA.
    In addition the ibaPDA-Technostring (non-structured ASCII-string with a length of up
    to 512 bytes) can be configured.

❑   SD-TDC-Request:
    The definition of the signals to be measured is independent of the connected con-
    trol unit system. All changes are done in ibaPDA. ibaPDA supports the functionality
    to select the internal TDC variables by their names, i.e. the chart, function block and
    the connector names. To do that for every TDC CPU special service function blocks
    must be included in the CFC chart of the control unit.
    The information about the variable names (address books) is transferred from the
    TDC CPU to the ibaPDA system directly via the ibaFOB-TDCexp card.
    ibaPDA supports up to 4 cards with up to 50 processor connections per card and
    additionally, the ibaPDA-Technostring.

Note

An additional software license "ibaPDA-Request-TDC" is required in order to use the SD-/TDC request function. It must be enabled on the iba software dongle.

The service function blocks required for the request function are included in the iba function block library FBAPDA. You find the library on the DVD-ROM delivered with ibaPDA.

Other documentation

The configuration of the request function is described in the "ibaPDA-Request-SD-TDC" manual.
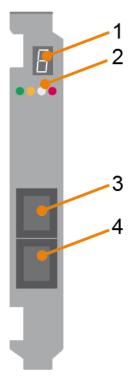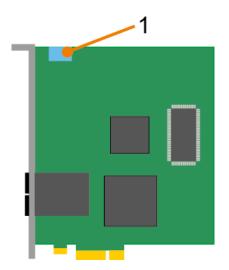
5.4   Front view

1 7-segment display

2 Device status LEDs

3 FO connector (SC technology)

4 FO connector (SC technology)

Figure 2:   Front view

5.5   Plug and socket connections

1 Synchronization (Sync-IRQ-connector)

Figure 3:   Plug and socket connections

5.6   Indicators

5.6.1   Device status LEDs

LEDs indicate the operational state of the card and fiber optic channels. On power on all LEDs are lit for a few seconds to prove their proper function.

LED	Status	Indication
(green)	Off	Card is dead or defect
	Blinking	Normal operation
(yellow)	Off	No signals detected; fiber optics not connected or TDC is switched off
	Blinking	Connection ok, but TDC system not ready
	On	Connection ok, TDC system ready
(white)	Off	No data transfer
	On	Data transfer in progress
(red)	Off	Normal state
	Blinking	Running in FPGA factory rescue mode
	On	Hardware failure (FPGA not configured)

5.6.2   7-segment display

The 7-segment display shows the following information:

❑ Horizontal bar: After switching on, until the initialization by ibaPDA
                                  is finished.

❑ Card ID (ranging from 0 to 3): After card was initialized

❑ The decimal point is ON: Card is configured as an internal interrupt master

❑ The decimal point is OFF: Card is configured as an interrupt slave

❑ The decimal point is blinking: Card is configured as an external interrupt master

Note

It is not allowed to configure the ibaFOB-TDCexp as **external** interrupt master.

5.7   Fiber optical interface

ibaFOB-TDCexp provides 1 duplex SC type jack with 1 optical transmitter and 1 optical receiver.

6   Mounting and dismounting

6.1   Safety information

The cards may be used in every PCIe 1.0-x1 compatible slot.

⚠ DANGER

Electric shock!

Switch off the PC and disconnect it from the mains power supply before opening!

⚠ CAUTION

Electrostatic discharge!

This card contains components which can be destroyed by electrostatic discharge. Before touching the card make sure that your body is electrically discharged or work in a designated ESD protected area!

The standards for handling electrostatic sensitive devices (ESD) must be followed.

6.2   Mounting

1. Shut down the PC.

2. Unplug the mains power line and open the PC so you can reach the PCIe slots.

3. Take the card carefully out of the package. Use a grounding cable or discharge any electrostatic   charge   before   taking   the   card. No wiring or jumpering is necessary.

4. Grab the card at the front plate and the rear upper corner. Do not touch the contacts.

5. Plug in the card carefully into a free PCIe slot and fix the card to the housing of the PC.

6. If more than one iba card is installed connect all cards with one another by the flat ribbon cable (sync cable), see chapter 9 "Synchronization of the iba cards".

7. Close the PC.

8. Plug in the power line and start the PC.

6.3   Dismounting

1. Shut down the PC.

2. Unplug the mains power line and open the PC so you can reach the PCIe slots.

3. Disconnect all external connections from the card.

4. Release the fixing screw.

5. Unplug the card carefully out of the slot. Store the card in an appropriate container.

7   Configuration

7.1   Configuration on SIMATIC TDC

7.1.1   SD-TDC-lite transmission channels

When projecting the transmission channels, the following is to be observed:

❑ The names of the channels are established and should not be used elsewhere. The names of the max. 16 transmission channels (from the perspective of the control) are as follows:

- Channel 1:   M**0**PDADAT

- Channel 2:   M**1**PDADAT

  :   :

- Channel 10:   M**9**PDADAT

- Channel 11:   M**A**PDADAT

  :   :

- Channel 16:   M**F**PDADAT

❑ The data structure of the telegrams is established and cannot be changed: 32 analog values as data type FLOAT and 32 binary values as DWORD.

❑ The channels are to be projected as process data channels in the REFRESH or MULTIPLE channel mode.

Important information

All channels must support the same channel mode, either all REFRESH or all MULTIPLE.

❑ The channels can be on different processors. The CTS connectors of the transmission function blocks must indicate the rack link component to which ibaFOB-TDCexp is also connected (GDM).

❑ The channels can be projected in different time slices.

❑ The "CTV" or "CTV_P" function blocks are to be used for transmission.

Note

When using the CTV function block, you have to apply all telegram data to the virtual connection, see figure 4.

When using the CTV_P function block, you only have to enter the telegram length 132 bytes at the NBY connector, see figure 5.

Note

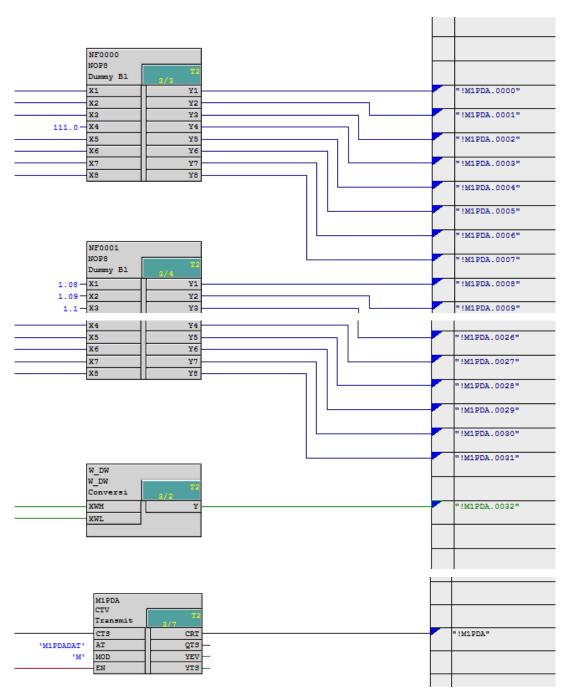All analog values are to be converted to FLOAT, if applicable.

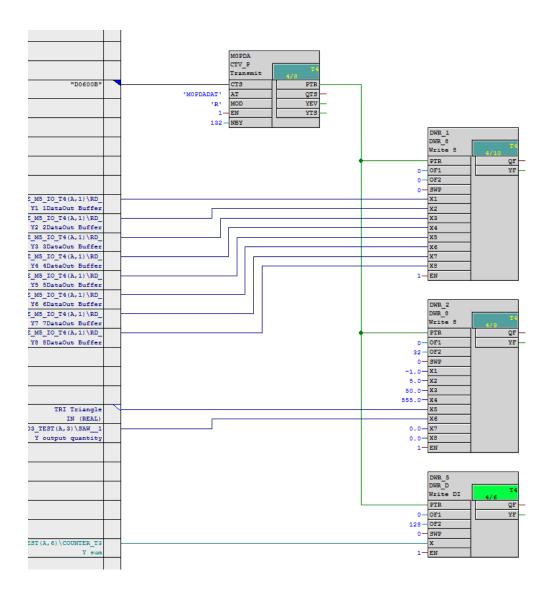Figure 4:   Configuration transmission channel with CTV

Figure 5:   Configuration transmission channel with CTV_P

Description of the CTV_P connectors:

Connector	Value	Description
CTS		Component name of CP52A0, connection to GDM
AT	M0PDADAT	Name of the transmission channel
MOD	R	REFRESH channel mode
EN	1	Transmits the cycle of the time slice
NBY	132	Telegram length in bytes
PTR	-	Pointer on telegram buffer which must be connected to the PTR connector of the DWR-xx function blocks

7.1.2   SD-TDC-lite reception channels

Note

Though the current firmware version provides the reception channels, they are not yet supported by iba-Software.

7.1.3   Technostring

The Technostring (TS) is a slow process data channel with which additional non-cyclical alphanumeric data that accompany the measurement can be transmitted to ibaPDA. The TS runs independently of the PDA data channels.

The TS channel must be projected on the control side. The user has to make sure that the TS is transmitted to ibaPDA in case of a change or in a slow cycle (>= 1 second).

The TS channel is queried each second by ibaPDA.

Note

Only 1 TS is possible for each rack link. However, beyond the rack link you have the possibility of transmitting other technostrings, e.g., via TCP/IP or serial interface.

The channel characteristics are defined as follows:

ibaPDA-Technostring	
Channel name	PDA_ASCI
Channel length	512 Byte
Data format	Unformatted alphanumeric character string
Channel mode	Handshake
Use	Transmission of strip attributes, technology and material related data before entry of a new strip in the rolling train.
Cycle	1 second

Note

When using the CTV function block, you have to apply all telegram data to the virtual connection or put the telegram together from partial telegrams.

When using the CTV_P function block, you only have to enter the telegram length 512 bytes at the NBY connector.

Note

Make sure that non-printable characters are used to indicate the end of the string, e.g. 0x0D ('CR') or 0x00 ('NUL').

7.1.4   Time synchronization

If you want to synchronize the time of the ibaPDA system with the Siemens control, then you have to project an *RTCM* function block that reads the system time from a source or generates it itself and distributes it on the frame. This time function block may only be projected once per frame.

Synchronization is done by means of a DCF77 digital signal that is generated on the control:

On the control side, project on one CPU a *DCF77* function block in the fastest sampling time (<5 ms). This function block supplies a digital DCF77 signal with polarity 0=active. Put it on a bit of a TDC-lite telegram.

The function block is contained in the FBAPDA function block library of iba AG. (If you require more information, please contact the support of iba AG.)
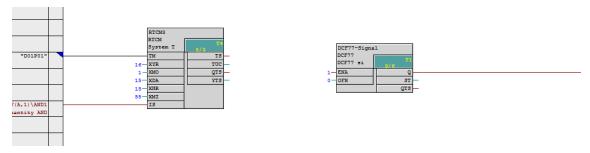

Figure 6:   Configuration DCF77 time signal

Alternatively the **synchronization can be done with an IEC-1131 time signal**. For this, convert the integer value of the relative time stamp of the function block RTCREL (seconds and 1/10 milliseconds starting 01/01/1988) to the data format REAL and enter the values into the SD-TDC-lite telegram.
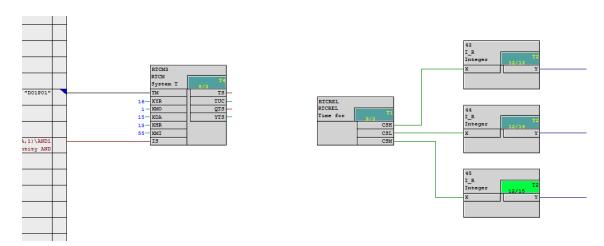

Figure 7:   Configuration ICE-1131 time signal

7.2   Configuration in ibaPDA

If the card has been installed correctly it should be available in the I/O manager's signal tree as a data interface. If you click on the interface icon you will get a simplified image of the card and essential information in the right part of the dialog.

7.2.1   Card configuration

Select the „Configuration" tab.

Interrupt mode

The interrupt mode is automatically generated by ibaPDA: as soon as an ibaFOB-D card is being used for configuration it is specified as "Interrupt-Master". The "Slave-Mode" is activated for ibaFOB-TDCexp. In case the ibaFOB-D card is not being used but several ibaFOB-TDC(exp) or ibaFOB-SD(exp) cards are activated, the mode "Interrupt-Master intern" can be defined for one of these cards. As a result this card will generate the interrupt for the other cards (Interrupt-Slaves). The interrupt will be transmitted to these iba cards via the synchronization cable (sync cable is included in delivery).

Check the option "In use" if the card is being used by ibaPDA; remove the tick in the "In use" checkbox for all other applications, e.g. ibaLogic.
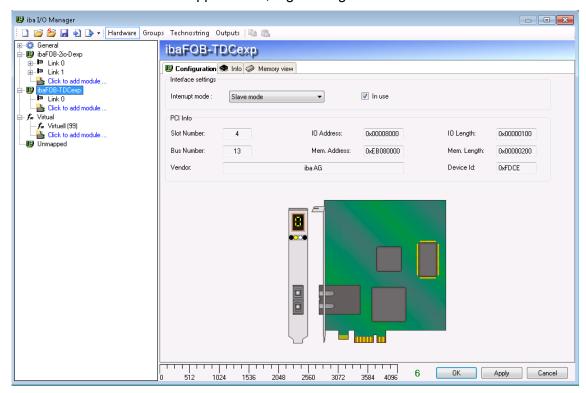

Figure 8:   Card representation of ibaFOB-TDCexp

↗ Further data and tabs are described in chapter 8 "Diagnostics".

7.2.2   Link configuration

If you mark the „Link 0" under the ibaFOB-TDCexp card in the signal tree, then the menus for diagnostics of the communication connection appear on the right side.

Figure 9:   Link level for ibaFOB-TDCexp

In the "Configuration" tab you will find the data and entry fields which are necessary for the connection to the GDM:

❑ BGT name for PC:
With this name, ibaPDA logs in on the rack link function block group as BGT.
Default setting: "PDA001"
If there are several ibaPDA or ibaQDR system links to the GDM, it is recommended to change the BGT name. For this purpose start the Windows Registry Editor "regedit".
You will find the key "TDCE_BgtName" under
HKLM\SYSTEM\CurrentControlSet\Service\PdaDrv.

❑ BG name of FOB-TDCexp link:
With this name, iba FOB-TDCexp logs in on the rack link as BG. The default setting is the ibaPDA license number, limited to 6 characters.

Important note

If there are several ibaPDA systems connected to a computer coupling, you have to enter different BG names. The name of the connection needs to be unique within the rack link.

❑ BG name of the CP52M0 (GDM):
When the link is established, you can read the BG name from the control by a click on <Autodetect system info>.

❑ CFC software version (GDM):
When the link is established, you can read the version of the software from the control by a click on <Autodetect system info>.

Note

The following options will not be displayed if an "ibaPDA-Request-TDC" (31.001330) license is available. In this case the options for the TDC-Request-Interface are applicable.

Options:

❑ Auto disable signals on broken links:

If this function is activated, the measurement channels of the CPUs which do not an-
swer are temporarily disabled. This occurs e.g. when a frame is switched off while
ibaPDA starts acquisition. At the next start, they are active again.

❑ Enable broken link reconnect detection:
When the FO link to the GDM is interrupted or the GDM is switched off, ibaPDA keeps
running with the last received values frozen. With this option you can restart ibaPDA after
the link is reconnected.

❑ Enable BGT restart detection:
When a rack which is connected to the GDM will be switched off, ibaPDA keeps running
with the last received values frozen. With this option you can restart ibaPDA after the
deactivated rack is available again.

Note

ibaPDA will not be restarted after the restart of another ibaPDA or ibaQDR system which
is connected to the same GDM if the BGT name of this system is "PDA00x" (x=1…9).

↗ For description of other tabs, please refer to chapter 8.2 "Link diagnostics"

7.2.3   Configuration of data modules

Add module

To add a module, mark the data interface link "Click to add module…" in the signal tree
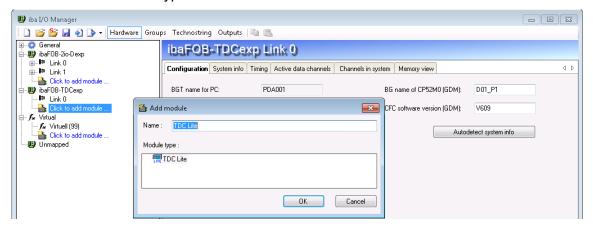and select the module type.

Figure 10:   Add the TDC-Lite module

Note

When a connection exists, a TDC-Lite module with the correct channel name is auto-
matically created for each transmission channel which was found in GDM. For this,
choose from the "Link 0" context menu (right mouse click) the "Autodetect" menu point.
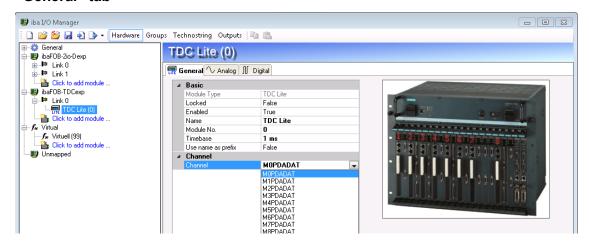

"General" tab

Figure 11:   "General" tab

On the "General" tab, the following standard settings can be found:

❑ Locked:
The module can be locked to avoid unauthorized access to module settings

❑ Enabled:
Data capturing for this module is enabled; data capturing for deactivated modules is not possible

❑ Name:
You can enter a name for the module

❑ Module No.:
Internal reference number of the module

❑ Time base:
Here all signals of the module are captured. The time base should be adjusted to the configured time slice of the transmission block of SIMATIC TDC (multiple of general ibaPDA acquisition cycle time)

❑ Use name as prefix:
Prefix the signal names of this module with the module name

❑ Channel:
You can select the channel name M0PDADAT….MFPDADAT.

Note

If you click on a field, the associated description is displayed in the text field below the entry field. For more details on the parameters, please refer to the general ibaPDA manual.

"Analog" and "Digital" signal tables tab

In the "Analog" and "Digital" signal tables you can specify the analog and digital signals which are measured in the SIMATIC TDC telegrams.
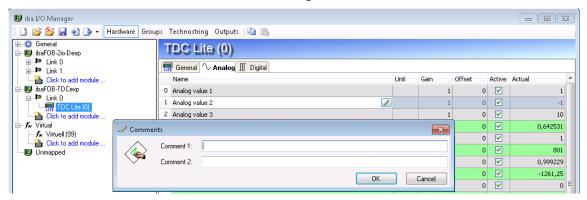

Figure 12:   "Analog" tab

❑ Name:
Here you can enter a name for the signal. Two additional comments can be defined for each signal by clicking on the ✎ icon.

❑ Unit:
Assignment of a physical unit.

❑ Gain / Offset:
For analog values, there is the possibility of scaling the measured raw values to physical values.

❑ Active
Here you can select a specific captured value.

❑ Actual:
Display of current variable raw values in numerical representation.

Other documentation

You will find a more detailed description of the columns in the general ibaPDA manual.

7.2.4   Configuration of Technostring

If the card has been installed correctly the interface TDC should be available under Tech-nostring.

After adding the module Technostring you can enter the data that are needed for the Technostring reception and the data processing.

After entry of the standard parameters the following settings must be defined:

❑ Entry of terminator character according to the Technostring definition in chapter 7.1.3 "Technostring", default is 13 ('CR').
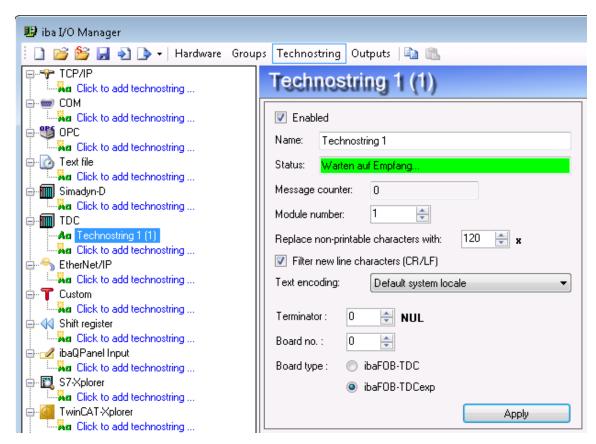
❑ Selection of board type ibaFOB-TDC or ibaFOB-TDCexp.

Figure 13:   ConfigurationTechnostring

Other documentation

For more detailed description of the Technostring configuration, please refer to the general ibaPDA manual.

7.2.5   Time synchronization

If you want to synchronize the time with a SIMATIC TDC-CPU, the following actions are necessary:

Synchronization with DCF77 signal:

❑ On the control side, configure the DCF77 time signal and put the bit in the binary scope of a SD-TDC-lite channel, see chapter 7.1.4 "Time synchronization".

❑ Choose the time synchronization with DCF77 signal in the ibaPDA I/O manager.

❑ Select the digital DCF77 signal previously taken up in the measurement and set the polarity to "Log. 0".

After two minutes the time of ibaPDA and the time of the SIMATIC TDC system is synchronized.
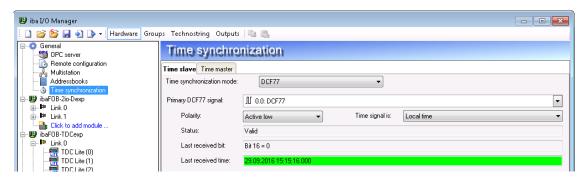

Figure 14:   Time synchronization with DCF77-signal

If required, you can specify an additional DCF77 signal on a CPU of another rack. This secondary signal only becomes active if the CPU on which you have projected the primary DCF77 signal fails.

Synchronization with IEC 1131 time signal:

❑ Configure the relative time stamp, convert the values to REAL data type and put them in a SD-TDC-lite telegram.

❑ Calculate the IEC time signal (relative to 01/01/1972) from the SIMADYN D time stamp (relative to 01/01/1988) by means of virtual signals:

▪ Add "567993600" to the seconds

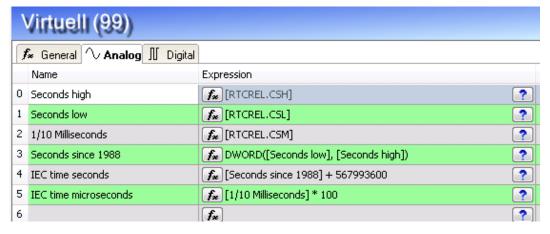▪ Multiply the 1/10 milliseconds with "100".

Figure 15:   Calculation of the IEC 1131 time signal

❑ Select the time synchronization with IEC 1131 in the ibaPDA I/O manager.

❑ In the pick-lists "IEC 1131 time signal" and "Microsecond signal", select the calculated virtual signals "99:4 IEC time seconds" and "99:5 IEC time microseconds".
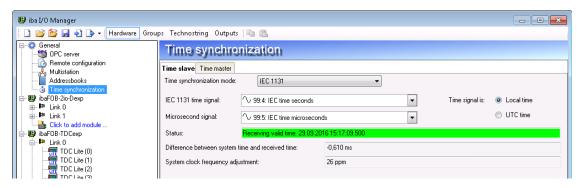

Figure 16:   Time synchronization with IEC 1131 time signal

8 Diagnostics

The essential tools for diagnostics are integrated in the I/O manager of ibaPDA.

8.1 General card diagnostics

If you click on the data interface in the tree structure, the image of the card with essential information appears in the right part of the dialog window.

8.1.1 "Configuration" tab

↗ Representation of the card, see chapter 7.2.1 "Card configuration".

In this tab you will find details on the interface settings and the following information:

❑ PCI bus information:
Name of vendor and device ID, slot and bus number, IO and memory address, IO and memory length are displayed here.
If these fields are empty or contain implausible data, the card is not properly plugged into the PCI slot.

❑ Schematic depiction:
The graphic depiction of the card is dynamic, i.e. the 7-segment display with the card number and the LEDs for the connection status reflect the same status that can be seen on the card itself.

↗ The displays and their meanings are summarized in chapter 5.6 "Indicators".
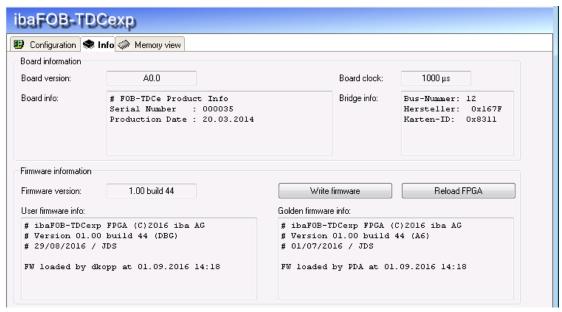
8.1.2 "Info" tab

Figure 17: Information

Here you will find information about the card and the current firmware. Service and support features are also integrated, e.g. the reload of the FPGA and the firmware update.

By clicking on the button <Write firmware> a dialog box is opened and the relevant file can be selected.

> **Important note**
>
> An update of the firmware should only be executed after consulting the service and support department of iba AG.

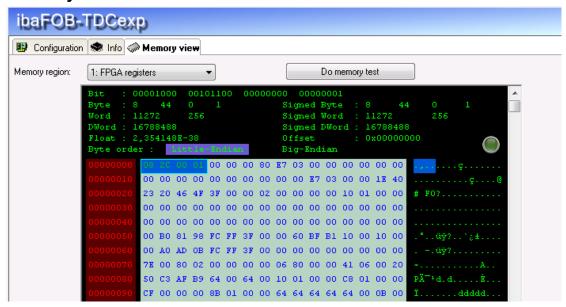### 8.1.3 "Memory view" tab

Figure 18:		Memory view

Here five different memory regions of the ibaFOB-TDCexp card are displayed as hexa-decimal codes and strings. The relevant memory region can be selected in the pick-list "Memory region".

In the context menu (opened by a right mouse click) you can enter the memory address as a decimal or hexadecimal number and you can freeze the display.

## 8.2	Link diagnostics

> **Other documentation**
>
> For a more detailed description of the following card diagnostics dialogs, please refer to the ibaPDA-Request-SD-TDC manual.

### 8.2.1	"Configuration" tab

On the "Configuration" tab, you can enter the data that are needed for the connection of ibaPDA to the SIMATIC TDC system.

Figure 19:		Configuration data

When the link to the GDM is established, you can read system data from the GDM by a click on <Autodetect system info>.

↗ For more information on the fields, please refer to chapter 7.2.2 "Link configuration".

8.2.2   "System-Info" tab

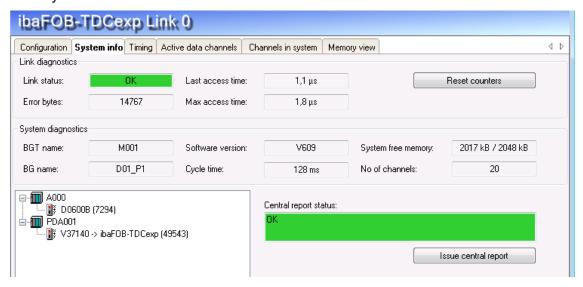The "System info" tab provides information about the link from ibaPDA to the SIMATIC TDC system.

Figure 20:   System information

❑ Link diagnostics
shows link status (OK, Error), Error counter, last and max. access time. A click on the <Reset counters> button resets error counter and max. access time.

❑ System diagnostics
shows system information (BGT name, BG name, software version), memory allocation of the GDM and the number of channels specified in the GDM. The displayed cycle time is the time, the link is monitored on the ibaFOB-TDCexp side and the life counter of the GDM registration is incremented.

❑ Registration area
includes BGT and BG names of the connected racks (including links to ibaPDA) and the registration status. Using the button <Issue central report> the ibaFOB-TDCexp card can be registered on the GDM. However, this is not necessary, because it is automatically done by ibaPDA with the first start of the acquisition.

8.2.3   "Timing" tab

Here you'll find information about access of the card to the SIMATIC TDC CPUs and the access of the card to the memory (DMA).
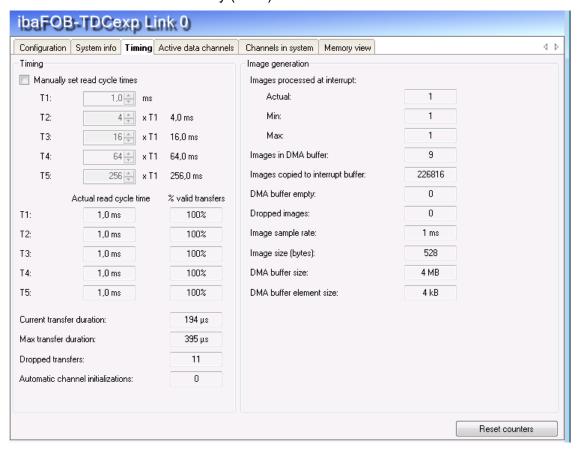

Figure 21:   Timing

Timing

These settings apply to the cycle times which are only relevant for the SD-TDC Request system. For SD-TDC-lite cards all channels are assigned to cycle time T1 corresponding to the ibaPDA time base.

The following sections provide essential information:

- Current transfer duration:
  Duration of the transfer of one sample. The ratio of the "Current transfer duration" to the smallest "Actual read cycle time" gives information about the load factor of the ibaFOB-TDCexp card.

- Max. transfer duration:
  Maximum duration of a data transfer since the last reset of the counters.

- Dropped transfers:
  Number of dropped samples since the last reset of counters.

- Automatic channel initializations:
  Diagnostic counter for automatic actions.

Note

You will find more information about the settings of cycle times in chapter 11.1 "Configuration of cycle times".

Image generation

Diagnostic information of DMA access to the ibaPDA memory.

8.2.4   "Active data channels" tab

Here you'll find a table with all data channels, showing information on the specified time. All channels are assigned to T1 with a fixed length of 132 bytes.

A double-click on a row with data opens the memory view for this channel.

Figure 22:   Active data channels

8.2.5   "Channels in system" tab

Here you'll get information about the GDM and the configured communication channels. You may enter '?' as wildcard in the search string.

Figure 23:   Channels

The table can be structured hierarchically by moving column headers per drag & drop to the free section above.

Figure 24:   Channels, grouped by columns

8.2.6   "Memory view" tab

The memory region "1: FPGA registers" of the ibaFOB-TDCexp card is shown in the "Memory view" tab.

For more details, please refer to chapter 8.1.3 "Memory view" tab.

9   Synchronization of the iba cards

9.1   Important information
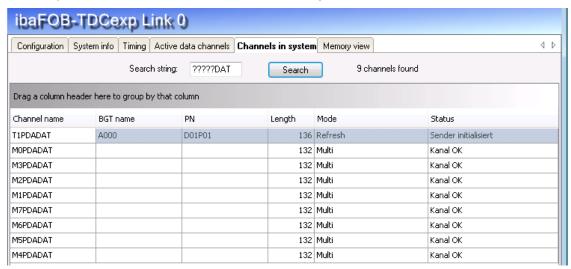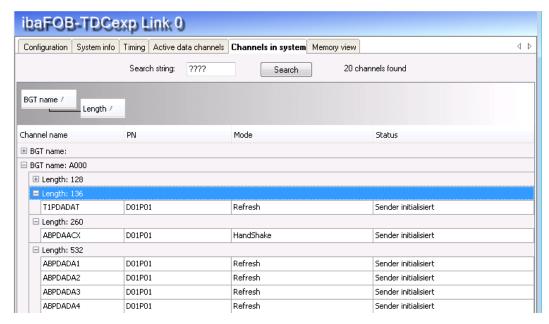
Important information

A bad or missing sync-connection may lead to inconsistent data blocks. This would affect the data integrity and data correlation!

Every delivered card comes with a synchronization cable (sync cable) for connecting up to 6 cards. Unused plugs of the cable can be left unconnected and must not be terminated!

If you plug in or unplug cards this may change the configuration of the PC. This can affect the signal or I/O configuration of the system because the ID of the cards may change!

In that case move the fiber optic cables to the correct card!

Always save your system configuration before changing hardware components!

9.2   Procedure

You should perform the following steps after you've installed the PCIe card:

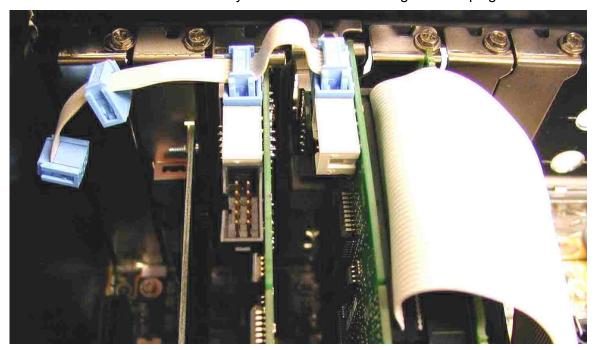**1.** Connect all iba cards with the synchronization cable using the blue plugs.

Figure 25:   Connecting multiple iba PCI cards by sync cable

2. Close the PC.

3. Plug in the power line.

4. Switch on the power supply of the PC.

5. Start the PC.

10   Technical data

10.1   Main data

Order No.	11.112601
Format/size	PCI Express card
Operating Temperature	From 32 °F to 122 °F (from 0 ˚C to 50 ˚C)
Storage Temperature	From -13 °F to 158 °F (from -25 ˚C to 70 ˚C)
Transport Temperature	From -13 °F to 158 °F (from -25 ˚C to 70 ˚C)
Cooling	Passive
Power Supply	Via PCIe 1.0-x1-compatible slot
Current consumption	up to 1000 mA
FO-cable	62.5/125 µm
Coupling	SC
Distance between 2 devices	Up to 1,312 ft. (400 m) without repeater
Weight (incl. Packaging and Documentation)	0.44 lb (200 g)
Number of TDC connections	1 (duplex)
Data transmission rate	640 Mbit/s
Fastest sample time	1 ms

10.2   Performance

Extract from a test protocol

ibaFOB-TDCexp is connected to the GDM.

All channels are configured to CU551 in time slice T1 = 1ms.

Read cycle = 1 ms	No. of channels	No. of DWORD	Act. duration [µs]	Max. duration [µs]	Duration per DW [µs]	Max. duration per DW [µs]
Measuring	1	33	61	64	1,85	1,94
	2	66	111	114	1,68	1,73
	3	99	158	165	1,60	1,67
	4	132	206	214	1,56	1,62
	5	165	255	265	1,55	1,61
	6	198	302	314	1,53	1,59
	7	231	356	367	1,54	1,59
CPU overload extrapolation	8	264	406	420	1,54	1,59
	9	297	457	471	1,54	1,59
	10	330	508	524	1,54	1,59
	11	363	559	577	1,54	1,59
	12	396	610	630	1,54	1,59
	13	429	661	680	1,54	1,59
	14	462	711	732	1,54	1,58
	15	495	762	788	1,54	1,59
	16	528	813	835	1,54	1,58

Legend:

Green	FOB load is OK
Grey	SIMATIC TDC CPU overload

The overload range of the SIMATIC TDC CPU is reached with approx. 7 channels or more; due to this, the extrapolation has been added to the chart.

The extrapolation shows, that even for 16 channels all values can be transmitted without any data loss with a sample time on 1ms by ibaFOB-TDCexp card.
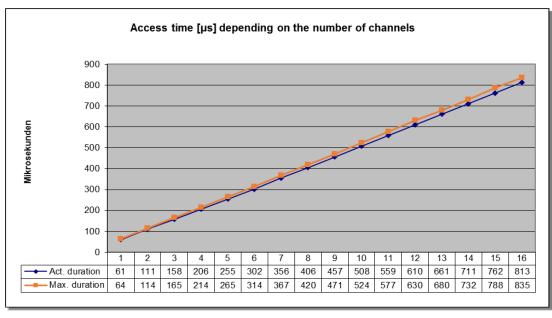

Access time [µs] depending on the number of channels

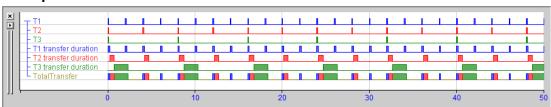|	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Act. duration	61	111	158	206	255	302	356	406	457	508	559	610	661	711	762	813
Max. duration	64	114	165	214	265	314	367	420	471	524	577	630	680	732	788	835

Figure 26:   Relation between sample time and number of channels

11 Appendix

11.1 Configuration of cycle times

The cycle times can be automatically calculated by ibaPDA depending on the configured channels, the requested signals and the cycle times of the connected CPUs. You can also manually configure these cycle times. Each cycle time must be a multiple of the base cycle time (T1).

Example

The figure shows how the channels are read. In the example there are 3 time classes with different transfer durations:

❑ T1=2 ms, transfer duration 0.2 ms

❑ T2=4 ms, transfer duration 0.5 ms

❑ T3=8 ms, transfer duration 1.6 ms.

The card tries to start a data transfer for each cycle time of T1, i.e., every 2 ms. If this cycle time coincides with the cycle time of another time class then the transfer for that time class is performed as well. If there is already a transfer busy when cycle time T1 is activated then the transfer scheduled to start at that time is not performed.

In the above-mentioned example at t=0 ms the cycle times for T1, T2 and T3 all coincide so a transfer is started that reads data for T1, T2 and T3. This transfer takes 0.2 ms + 0.5 ms + 1.6 ms = 2.3 ms.

Thus at t=2 ms the transfer is still busy when the next cycle time starts; as a result the transfer which should read data from T1 at t=2 ms is skipped.

At t=4ms a new transfer is started that reads data from T1 and T2. This takes 0.2 ms + 0.5 ms = 0.7 ms.

At t=6 ms a new transfer is started that reads data from just T1. This one takes 0.2 ms.

At t=8 ms the same procedure is executed as at t=0 ms.

In this example there is 1 transfer skipped every 4 transfers for time class T1. For all the other time classes no transfers are skipped.

On the "Timing" tab the rate of valid transfers will be 75% for T1 and 100% for T2 and T3. The current transfer duration shows the time it took the last transfer to be completed. The max transfer duration gives you an idea on how long the transfer takes when the reads for all time classes coincide. If this duration is longer than the T1 cycle time then T1 transfers will be dropped. If it is longer than the T2 cycle time then T2 transfers will be dropped as well.

12   Support and Contact

Support

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Note

If you require support, specify the serial number (iba-S/N) of the product.

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