ibaPDA-Interface-Reflective-Memory

Data Interface for Reflective Memory

Manual

Issue 5.0

Measurement Systems for Industry and Energy

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Version	Date	Revision	Author	Version SW
5.0	10-2024	ibaFOB-R board	RM	8.8.1

Contents

1 About this documentation

This documentation describes the function and application of the software interface *ibaPDA-Interface-Reflective-Memory*.

Other documentation

This documentation is a supplement to the *ibaPDA* manual. Information about all the other characteristics and functions of *ibaPDA* can be found in the *ibaPDA* manual or in the online help.

1.1 Target group and previous knowledge

This documentation is aimed at qualified professionals, who are familiar with handling electrical and electronic modules as well as communication and measurement technology. A person is regarded 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.

This documentation in particular addresses persons, who are concerned with the configuration, test, commissioning or maintenance of control systems using Reflective memory communication. For the handling of *ibaPDA-Interface-Reflective-Memory* the following basic knowledge is required and/or useful:

- Windows operating system
- Basic knowledge of *ibaPDA*
- Knowledge of configuration and operation of the relevant control system

1.2 Notations

In this manual, the following notations are used:

Action	Notation
Menu command	Menu *Logic diagram*
Calling the menu command	*Step 1 – Step 2 – Step 3 – Step x* Example: Select the menu *Logic diagram – Add – New function block*.
Keys	<Key name> Example: <Alt>; <F1>
Press the keys simultaneously	<Key name> + <Key name> Example: <Alt> + <Ctrl>
Buttons	<Key name> Example: <OK>; <Cancel>
Filenames, paths	`Filename`, `Path` Example: `Test.docx`

1.3 Used symbols

If safety instructions or other notes 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:

- Observe the specified measures.

Warning!

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

- Observe the specified measures.

Caution!

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

- Observe the specified measures

Note

A note specifies special requirements or actions to be observed.

Tip

Tip or example as a helpful note or insider tip to make the work a little bit easier.

Other documentation

Reference to additional documentation or further reading.

2 System requirements

The following system requirements are necessary for the use of the Reflective Memory data interface:

- *ibaPDA* v8.8.1 or higher for the *ibaFOB-R* support
- License for *ibaPDA-Interface-Reflective-Memory*
- The following board types are supported:
  - from ABACO or GE Intelligent Platforms

    Windows 64 bit systems (x64): PCIE-5565PIORC, PCI-5565PIORC, VMIC-5565, VMIC-5576

    Windows 32 bit systems (x86): PCIE-5565PIORC, PCI-5565PIORC VMIC-5565, VMIC-5576, VMIC-5579, VMIC-5587, VMIC-5588
  - from iba AG

    Windows 64 bit systems (x64): *ibaFOB-R*

    Windows 32 bit systems (x86): *ibaFOB-R*

For further requirements for the used computer hardware and the supported operating systems, please refer to the *ibaPDA* documentation.

License information

Order no.	Product name	Description
31.001220	ibaPDA-Interface-Reflective-Memory	Extension license for an *ibaPDA* system adding a data interface for connecting to a Reflective Memory node or network

If the *Reflective Memory* interface is not displayed in the signal tree, you can either check in *ibaPDA* under *General - Settings - License info* in the I/O Manager or in the *ibaPDA* service status application, whether your license *Hardware Reflective Memory* has been properly recognized.

3 Reflective Memory interface

The Reflective Memory (RM) interface is based on the use of a special hardware, manufactured by ABACO or General Electric (formerly by GE Fanuc and VMIC). RM interface boards are available for a variety of systems, such as PCI Express, PCI and VME. *ibaPDA* drivers support the boards VMIPCI 5565, 5576, 5579, 5587, 5588 and respectively the more recent models PCI-5565PIORC and PCIE-5565PIORC (see ↗ *System requirements*, page 7).

More recently, iba AG developed the *ibaFOB-R* board as replacement for the obsolete PCIE-5565 boards. Please refer to the *ibaFOB-R* manual for a detailed description of the board.

ibaPDA supports a total of 4 Reflective Memory boards. As the new *ibaFOB-R* is also seen as a Reflective Memory board, the *ibaFOB-R* can therefore be used 4 times or in combination with other Reflective Memory boards up to 4 in total.

The "Direct Memory Access" mode (DMA mode) is supported for the boards VMIPCI 5565 respectively PCI-5565PIORC and PCIE-5565PIORC, and also for the *ibaFOB-R*.

Note

The DMA functionality can only be used if an *ibaFOB* board is installed in addition to the Reflective Memory board to generate the required data acquisition interrupt.

This is not the case for the *ibaFOB-R* board, as this card is also capable of generating the data acquisition interrupt independently. However the *ibaFOB-R* interrupt will only be used in the absence of another *ibaFOB* board, which therefore always gets priority.

The Reflective Memory interface offers different module types.

- Reflective Memory with up to 1000 analog and 1000 digital signals per module, supporting asynchronous mode and DMA
- Reflective Memory dig512 with up to 32 * 16 digital signals per module, supporting asynchronous mode and DMA
- X-Pact Lite, with up to 1000 analog and 1000 digital signals per module, supporting asynchronous mode and DMA (only with license for X-Pact v1 and/or v2)
- HiPAC Request (only with HiPAC interface license)
- Reflective Memory Text

A maximum of up to 1024 modules are supported per interface.

The number of signals to be used is only limited by the *ibaPDA* license and the performance of the systems.

For further information on module configuration, refer to ...

- ↗ *Module type Reflective Memory*, page 22
- ↗ *Module type Reflective Memory dig512*, page 26
- Module type X-Pact Lite, description see manual *ibaPDA-Request-X-Pact*
- Module type HiPAC Request, description see manual *ibaPDA-Request-HiPAC*
- ↗ *Module type Reflective Memory Text*, page 27

Together with the Reflective Memory interface license and the appropriate interface boards you can furthermore use Reflective Memory as data channel for the Request products:

- Request-HPCi (incl. HPCi-Lite), refer to software manual *ibaPDA-Request-HPCi*
- Request-DTBox, refer to software manual *ibaPDA-Request-DTBox*

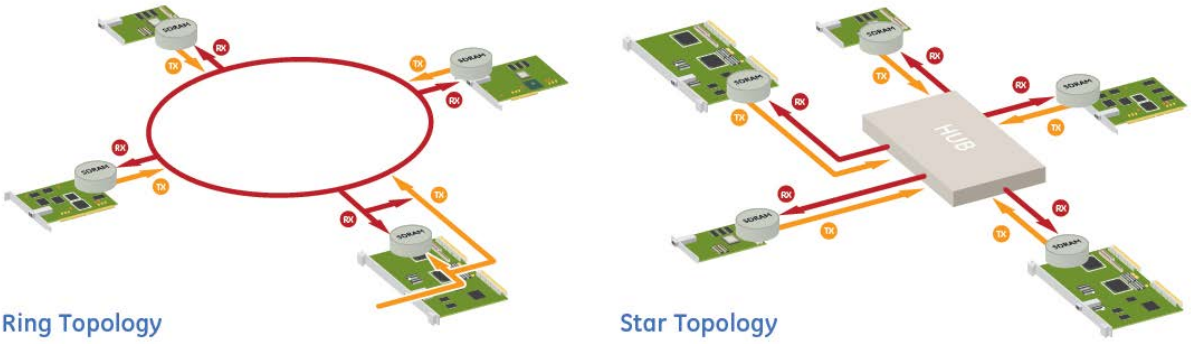
Functional principle
The PC boards are used to establish a connection to a RM network. P2P connections to a single node are possible as well.

An efficient and fast hardware architecture provides for deterministic data transmission with low latency and low CPU load.

Individual nodes on the network only need to write into/read from the dual port RAM and then within microseconds all nodes on the network have the same data.

3.1 System topologies

A Reflective Memory network can be set up in a ring or star topology.



Source: GE Intelligent Platforms

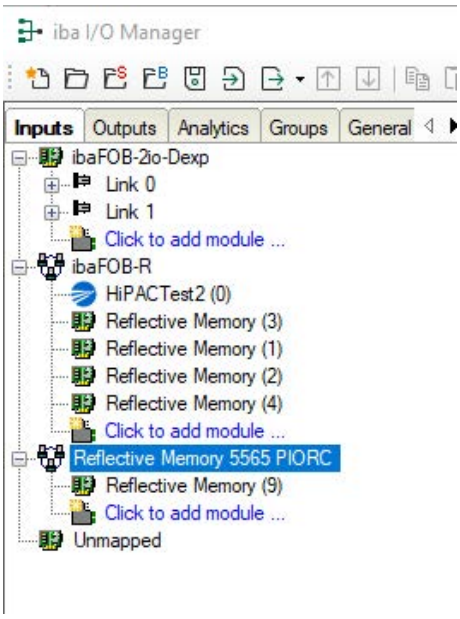
3.2 Configuration and engineering ibaPDA

Open the I/O manager, e.g., from the toolbar .

If all system requirements are met, the interface will be displayed in the signal tree:

- *Reflective Memory* interface, when using a legacy Reflective Memory board
- *ibaFOB-R* interface, when using the *ibaFOB-R* board

The interfaces are only visible if the Reflective Memory license is enabled (USB dongle or soft license) **and** a Reflective Memory interface board or *ibaFOB-R* board is installed in the PC.



3.2.1 Interface configuration

The Reflective Memory interface provides 4 tabs for the interface configuration: Properties, Info, DMA, Hex view.

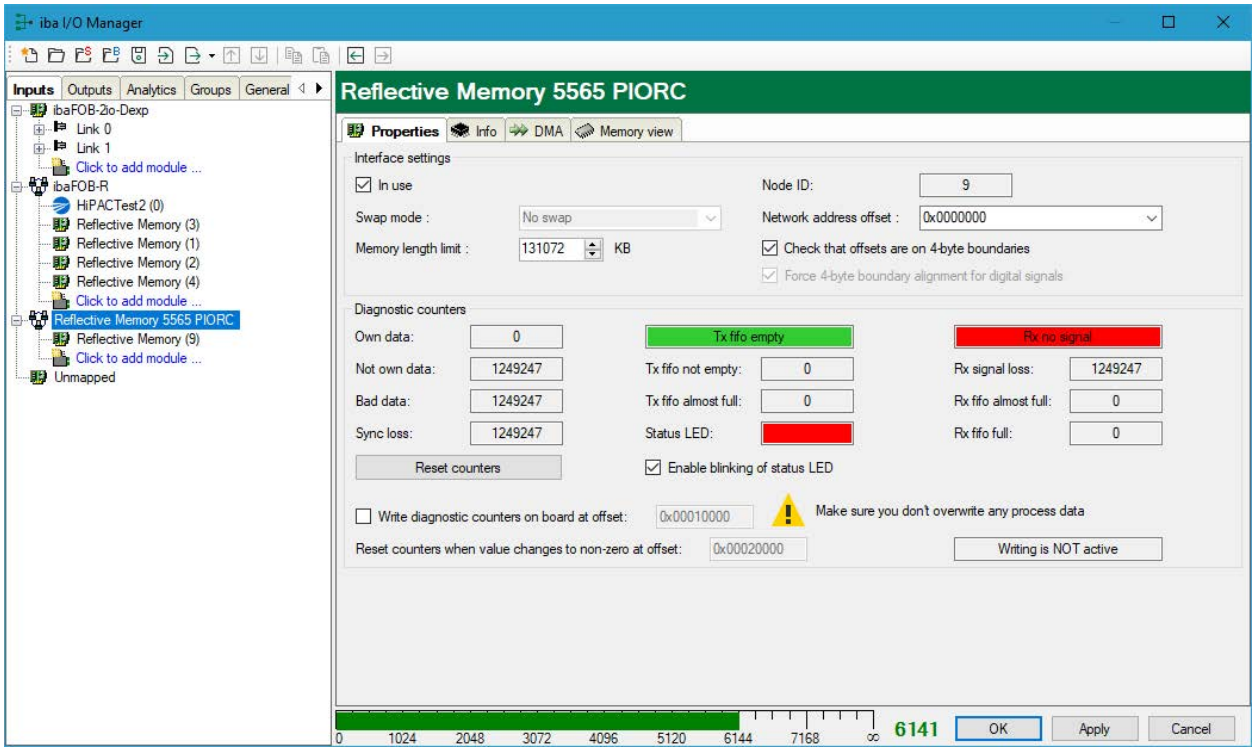
3.2.1.1 RM Interface – Properties

Depending on the Reflective Memory board used, different settings can be made.

- Settings for the legacy Reflective Memory boards, see ↗ *Properties for legacy RM boards*, page 11
- Settings for the *ibaFOB-R* board, see ↗ *Properties ibaFOB-R*, page 12

Diagnostic counters are displayed in the lower area of the *Properties* tab, see ↗ *Properties – Diagnostic counters*, page 14.

3.2.1.1.1 Properties for legacy RM boards



The part "Diagnostic counters" is not available for all boards.

Interface settings

"In use" check box
If the RM interface board should be used by *ibaPDA*, you must check this box.

This is, for example, necessary if *ibaPDA* and *ibaLogic* are active in a hybrid configuration on the PC, with each application having to use its own boards. One board must only be used by one application.

Swap mode
Select the appropriate swap mode from the drop-down list in this field. The drop-down list provides several options of high- and low byte swapping (Endian Control). Which swap mode is suitable for your configuration depends on the connected source system. Changes in this setting have immediate effect unless acquisition is running. If the acquisition is running at this time, the changing applies only after pressing <OK> or <Apply>. The acquisition is then stopped and restarted.

This setting is disabled with recent boards such as PCI 5565PIORC. You can select the swap mode in the settings of the data module, see ↗ *Reflective Memory – General tab*, page 22 .

Memory length limit
This parameter describes the size of the mapped memory space. You should adjust the memory size according to your needs, either by means of the up/down arrows or by entering a value. Reduce the size if you do not need that much memory length. This will save memory space in the *ibaPDA* computer.

Node ID
This is the node ID as set on the RM interface board in the *ibaPDA* computer. It is for display only and cannot be altered here.

Network address offset
This optional setting is only available if a card of VMIC 5576 type is used. The exact setting of a network address offset is required if a 256 kB or a 512 kB card is used in a 1 MB ring.

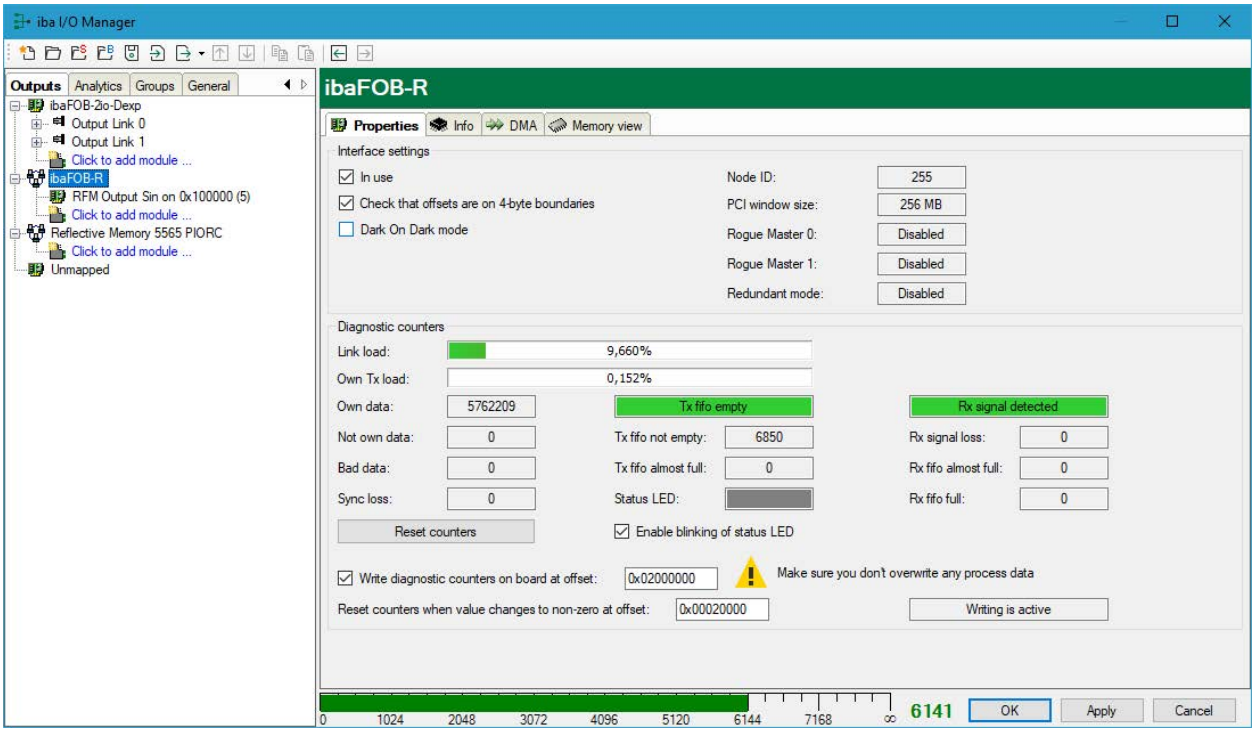
Check that offsets are on 4-byte limits
Usually, the checking of the 4-byte limits is selected by default in order to guarantee a data addressing without gaps. Data of 4-byte size (DINT, DWORD, FLOAT) must always be addressed on a 4-byte offset, relative to the start address. If not, an error message will be generated and the configuration is not valid.

When addressing data, otherwise than on 4-byte limits, be sure to disable this option in order to suppress error messages.

Force 4-byte limit alignment for digital signals
If this option is enabled, it makes sure that the data is always read along 4-byte limits. This is done to prevent sending of wrong data by some Reflective Memory boards if not reading exactly along 4-byte boundaries.

This option is enabled by default when a 5565PIORC board is used.

3.2.1.1.2 Properties ibaFOB-R



Interface settings

"In use" check box
If the *ibaFOB-R* board should be used by *ibaPDA*, you must check this box.

This is, for example, necessary if *ibaPDA* and *ibaLogic* are active in a hybrid configuration on the PC, with each application having to use its own boards. One board must only be used by one application.

Check that offsets are on 4-byte limits
Usually, the checking of the 4-byte limits is selected by default in order to guarantee a data addressing without gaps. Data of 4-byte size (DINT, DWORD, FLOAT) must always be addressed on a 4-byte offset, relative to the start address. If not, an error message will be generated and the configuration is not valid.

When addressing data, otherwise than on 4-byte limits, be sure to disable this option in order to suppress error messages.

Dark on Dark mode
This checkbox enables the dark-on-dark feature on the *ibaFOB-R* board.

If enabled, the board's transmitter will be turned OFF if the board's receiver does not detect a signal or if the receiver detects invalid data patterns. The dark-on-dark feature is especially useful in hub configurations.

Changes in this setting have immediate effect unless acquisition is running. If the acquisition is running at this time, the changing applies only after pressing <OK> or <Apply>. The acquisition is then stopped and restarted.

Node ID
This is the node ID as set on the *ibaFOB-R* board in the *ibaPDA* computer. It is for display only and cannot be altered here.

PCI window size
This value shows the selected window size for the reflective memory accesses. The default as displayed here, is the full installed memory size. The reduced memory window size choices are 64 MB, 16 MB or 2 MB. The value is for display only and cannot be altered here.

Rogue Master 0
This value indicates whether the Rogue Master 0 functionality is enabled on the board. Rogue Master functionality removes rogue packages from the network. The value is for display only and cannot be altered here.

Rogue Master 1
This value indicates whether the Rogue Master 1 functionality is enabled on the board. Rogue Master 0 and 1 if both enabled, cross check each other. The value is for display only and cannot be altered here.

Redundant mode
This value indicates whether the redundant transfer mode is enabled. In the redundant transfer mode, each generated packet transfers twice, the receiving circuitry evaluates both packages. The value is for display only and cannot be altered here.

3.2.1.1.3 Properties – Diagnostic counters

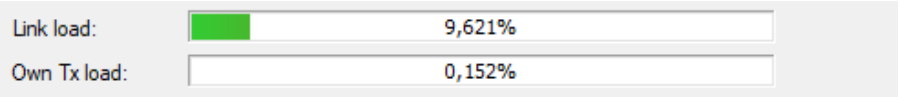
In the section *Diagnostic counters* you will find a couple of counters and status information which could be helpful when verifying the interface activity between *ibaPDA* and the Reflective Memory board.

Other documentation

A detailed description of the diagnostic counters and status information can be found in the user manual of the *Reflective Memory* board and in the *ibaFOB-R* manual.

Example PCI-5565PIORC: Hardware Reference, Publication No: Publication no. 500-9367855565-000 Rev. C
There, you will find the related information in the chapters 3.3.5 "Local Control and Status Register 1" (LCSR) and 3.3.6 "Local Interrupt Status Register" (LISR).

Diagnostic counter exclusively for ibaFOB-R



Link load
Total network load on the Reflective Memory network measured on the incoming (Rx) side of the fiber.

Own Tx load
Network load generated by this *ibaFOB-R* board sending data over the network (e.g. using output modules or writing the diagnostics counters)

Diagnostic counters for all supported Reflective Memory boards

- Own data
  Number of times LCSR bit 0 was 1
- Not own data
  Number of times LCSR bit 0 was 0
- Bad data
  Number of times LISR bit 8 was 1
- Sync loss
  Number of times LISR bit 11 was 1
- Tx Fifo not empty
  Number of times LCSR bit 7 was 0
  The field above this counter shows the status of the Tx Fifo as text.
  Therefore, the LCSR bit 8 is evaluated:

Status 0 = Tx Fifo empty + green background
Status 1 = Tx Fifo not empty + red background

- Tx Fifo almost full
  Number of times LCSR bit 6 was 1
- Status LED
  Status LCSR bit 31, refers to the red status LED on the board
- Rx signal loss
  Number of times LCSR bit 2 was 0
  The field above this counter shows the status of the Rx signal as text.
  Therefore, the LCSR bit 2 is evaluated:
  Status 0 = Rx no signal + red background
  Status 1 = Rx signal detected + green background
- Rx Fifo almost full
  Number of times LISR bit 9 was 1
- Rx Fifo full
  Number of times LISR bit 10 was 1
- Button <Reset counters>
  Click on this button in order to reset all counters to 0 (zero).
- Enable blinking status LED
  If you enable this option, *ibaPDA* will toggle the LCSR bit 31 in 0.5 Hz clock. This function can be used for monitoring of the communication between *ibaPDA* and the Reflective Memory board.
- Write diagnostic counters on board at offset...
  If you enable this option, then counter values and status information will cyclically be written into a memory range, which you can address by an offset in the adjacent entry field.
  Make sure that this range is not used for other data.
  This function is disabled by default because it is only needed for extended diagnostics.
  The following structure applies to the diagnostic data:

```
dword RfmOwnDataCnt
dword RfmOwnDataNotCnt
dword RfmRxSigLossCnt
dword RfmTxFifoAlmostFullCnt
dword RfmTxFifoEmptyNotCnt
dword RfmBadDataCnt
dword RfmSyncLossCnt
dword RfmRxFifoAlmostFullCnt
dword RfmRxFifoFullCnt
dword RfmStatusWord // bit 0 : Rx SignalDetected
                    // bit 1 : Tx Fifo Empty
dword RfmStatusToggle; // bit 0 : toggles every 0.5 sec,
 controls status LED on the board
```

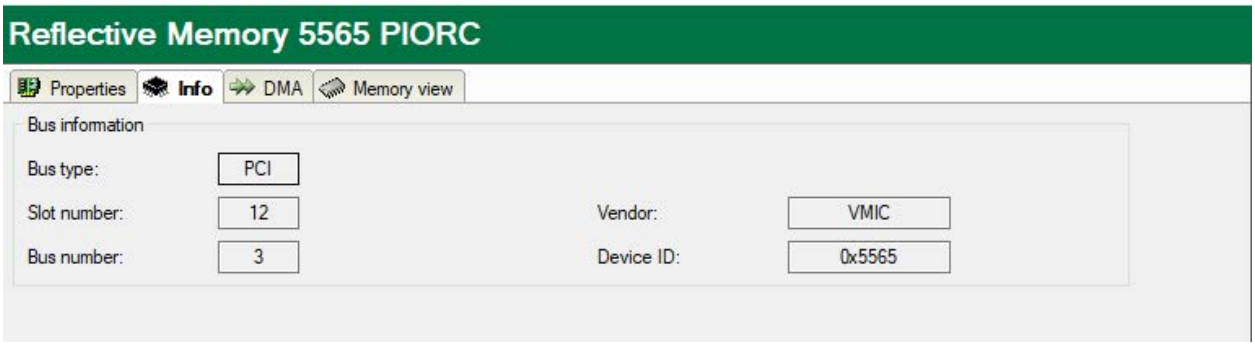
- Reset counters when value changes to non-zero at offset
  If you enable this option, then a memory, address which you can enter in the adjacent field, will be monitored.
  The display field further on the right indicates whether *ibaPDA* writes the diagnostic counters in the Reflective Memory or not (Writing is active/Writing is NOT active).

3.2.1.2 RM interface – Info

The *Info* tab contains information on the PCI bus or board. The displays differ depending on the RM board used.

PCI Info for legacy boards

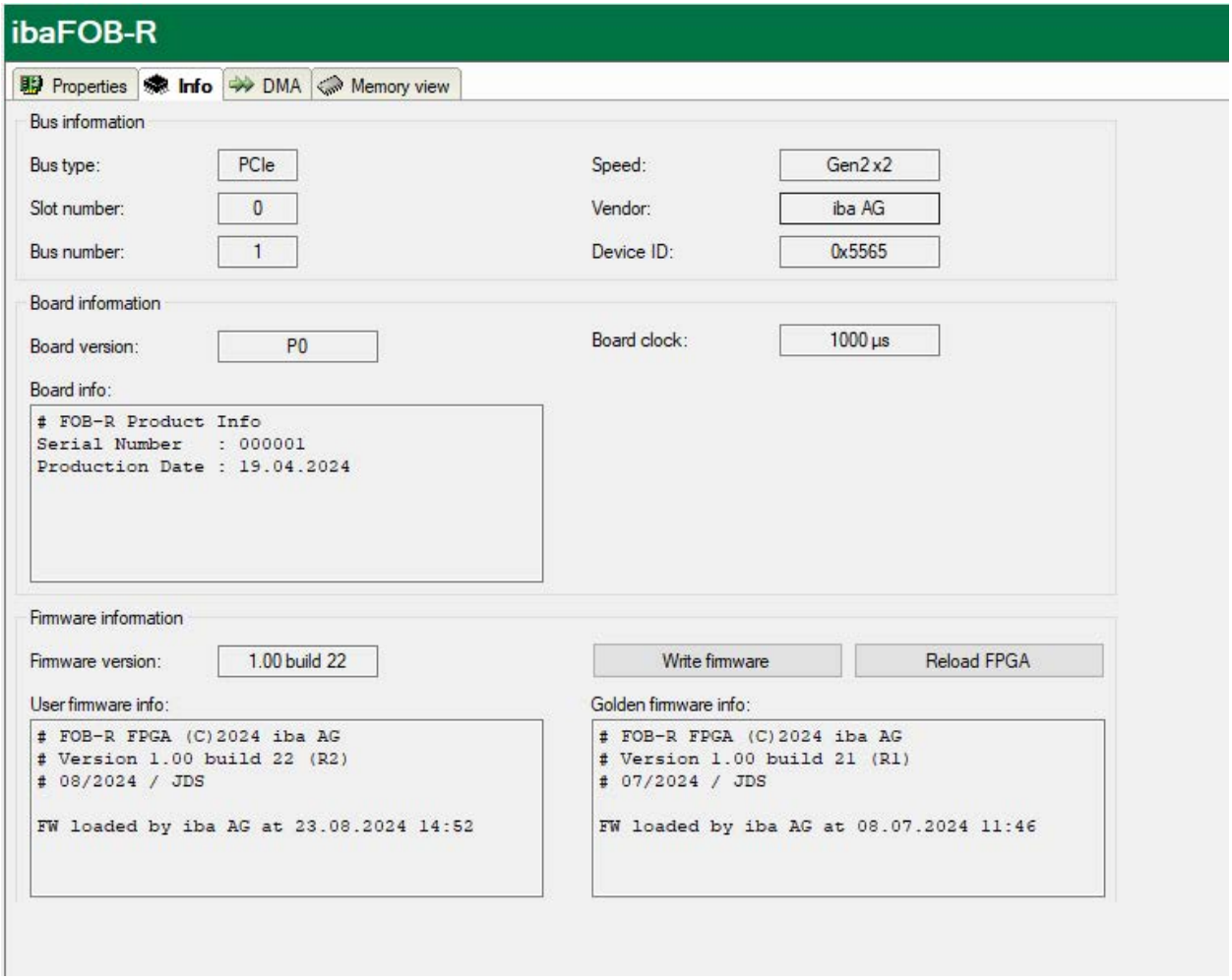
Mark the *Reflective Memory* interface in the interface tree and select the *Info* tab.



Besides vendor name and device ID you'll find the bus type, slot and bus number.If the fields are empty or contain implausible values, then the board is plugged into a wrong PCI slot.

PCI Info for the ibaFOB-R board

Mark the *ibaFOB-R* interface in the interface tree and select the *Info* tab.



Besides vendor name and device ID you'll find bus type, slot and bus number. Bus type should always be PCIe.

In the *Speed* field there is an indication of the speed generation and the number of lanes the board could reserve. The *ibaFOB-R* is designed for Gen 2 (5 GT/s per lane) and for 2 lanes (x2) on an x4 connector.

However, these speed parameters are determined at PC startup by the BIOS.

If a lower speed (Gen 1) or lower number of lanes (x1) is shown, place the *ibaFOB-R* in another slot where more lanes may be available (e.g. in a x8 or x16 slot). If necessary, consult your motherboard's manual.

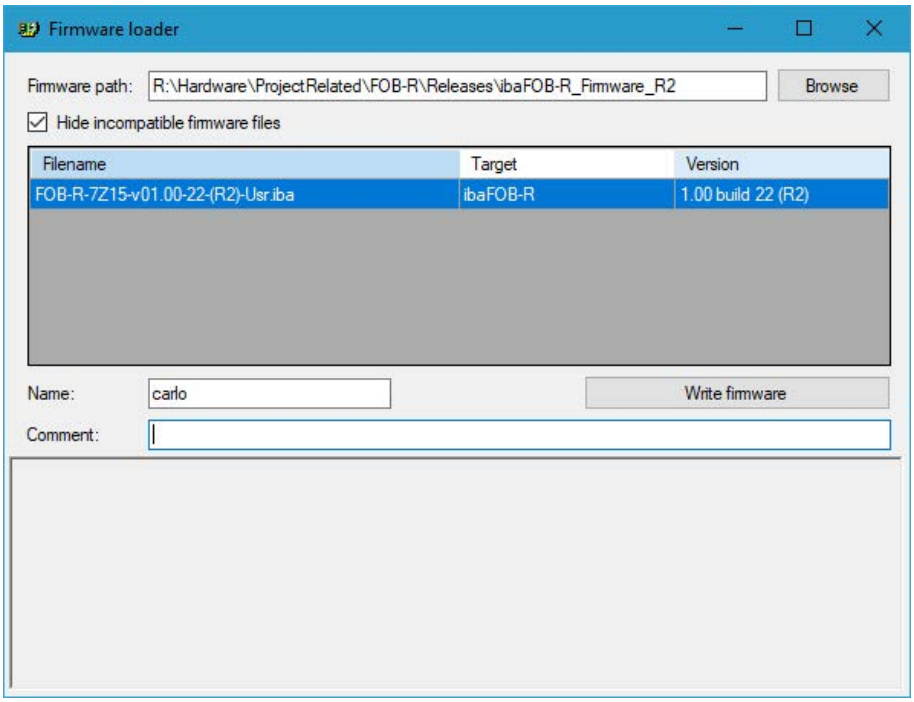
If the fields are empty or contain implausible values, then the board is plugged into a wrong PCI slot.

As with other *ibaFOB* boards, on the *Info* tab you can also see information about the board and the loaded firmware. Functions for service and support, such as reloading the FPGA and updating the firmware are available on this tab.

Note

A firmware update should only be performed after consulting the iba support.

By means of the <Write firmware> button, you open the *Firmware loader* dialog. Here you can select and load the correct file.



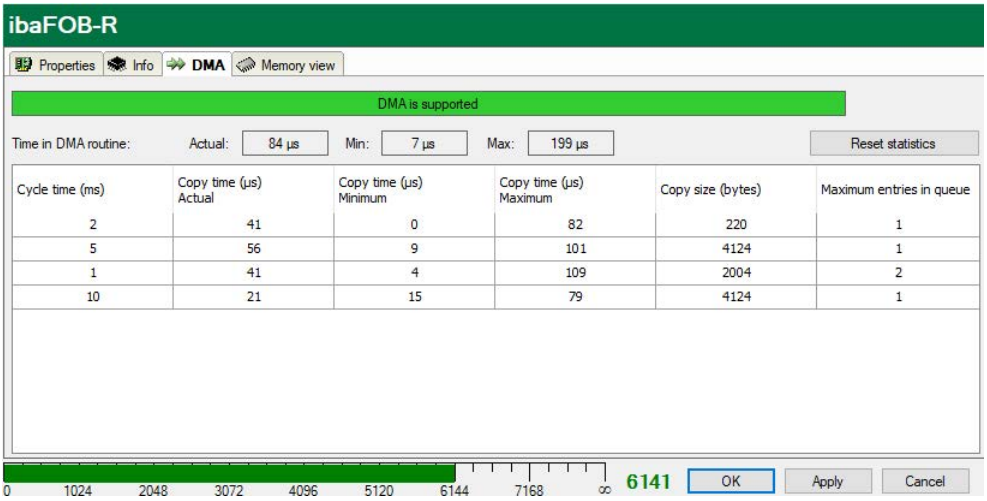
When you enter a directory path or use the <Browse> button, the table will show a list of firmware files found in that directory. You'll find the name of the file, the target board and the firmware version(s) in the file.

The file can contain the user firmware or the factory (Golden) firmware or both. Normally the "Golden" firmware is only written at production time. Click the <Write firmware> button to load the firmware into the board.

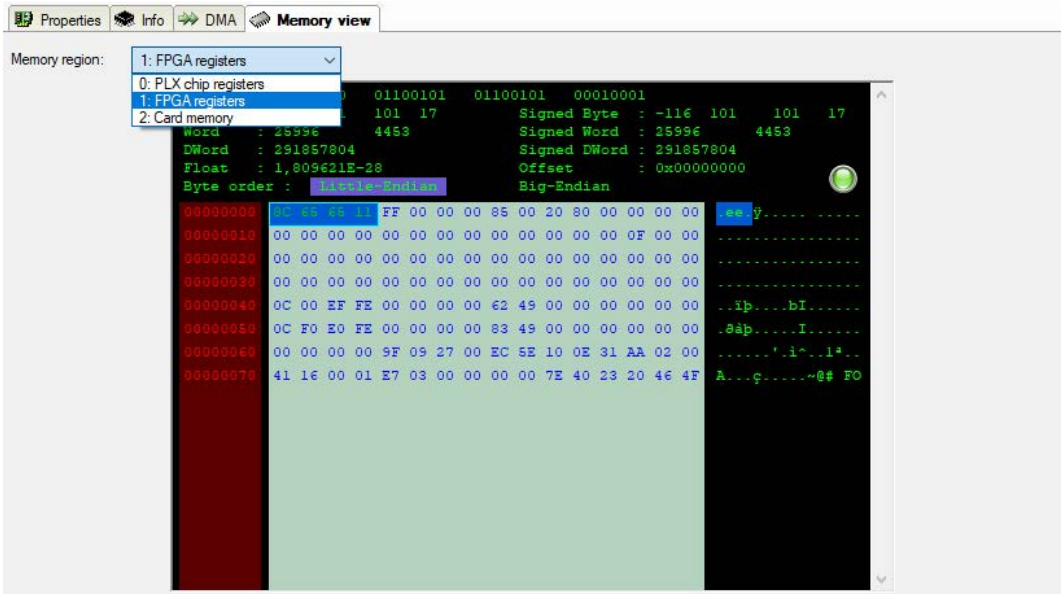
3.2.1.3 RM Interface – DMA

DMA stands for **Direct Memory Access**. It is a capability that is provided by the PCI bus architecture that allows sending the data directly from the reflective memory board to the computer motherboard memory.

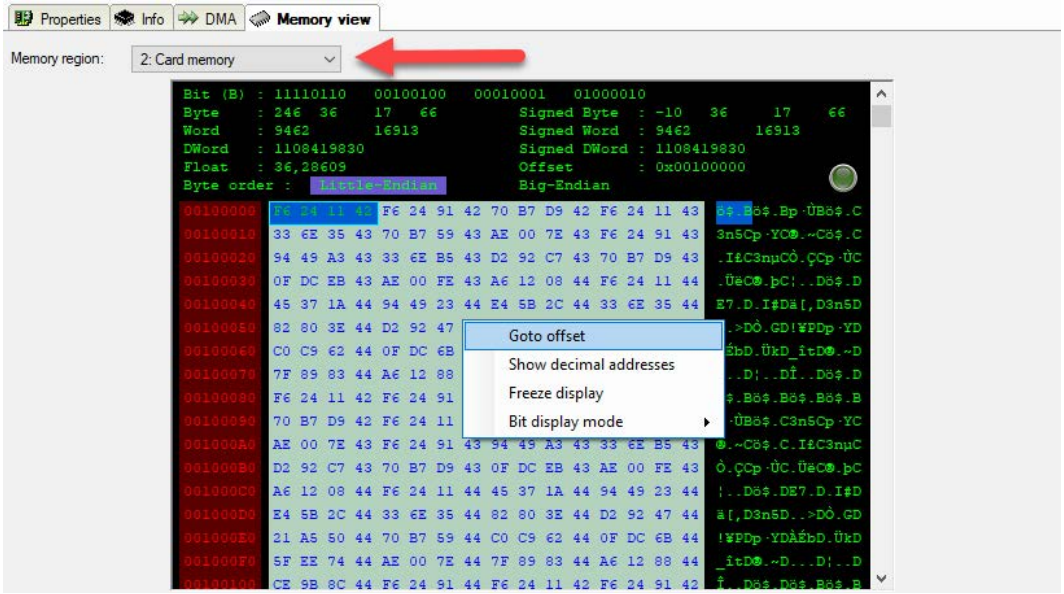
If the DMA mode is enabled (see ↗ *Reflective Memory – General tab*, page 22), you can find in the *DMA* tab information for diagnostic purposes about the data exchange between between the Reflective Memory interface board and the computer memory read by the *ibaPDA* driver software.



3.2.1.4 RM Interface – Hex view



This view provides very detailed information about the memory use in the different base addresses of the Reflective Memory to the service staff.



Usually there is no need to access this dialog. The blinking green light indicates a running system in which the visualization is refreshed. The offset addresses equal the address entries in the signal tables of the data modules only when the *Card memory* is selected as indicated by the red arrow above.

You can identify the formatting of the incoming data (Swap mode). A right mouse click opens a shortcut menu. It is possible to switch the address mode from hexadecimal to decimal (or vice versa) and to freeze the display with the shortcuts.

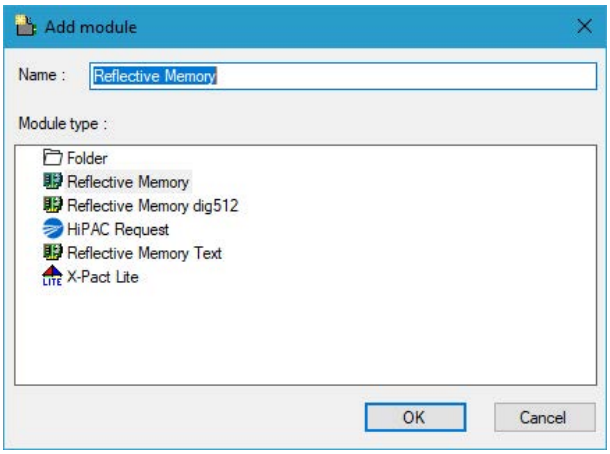
3.2.2 Add module

1. Add a module by clicking below the interface.

   There are different types of modules, which can be added to the Reflective Memory interface.

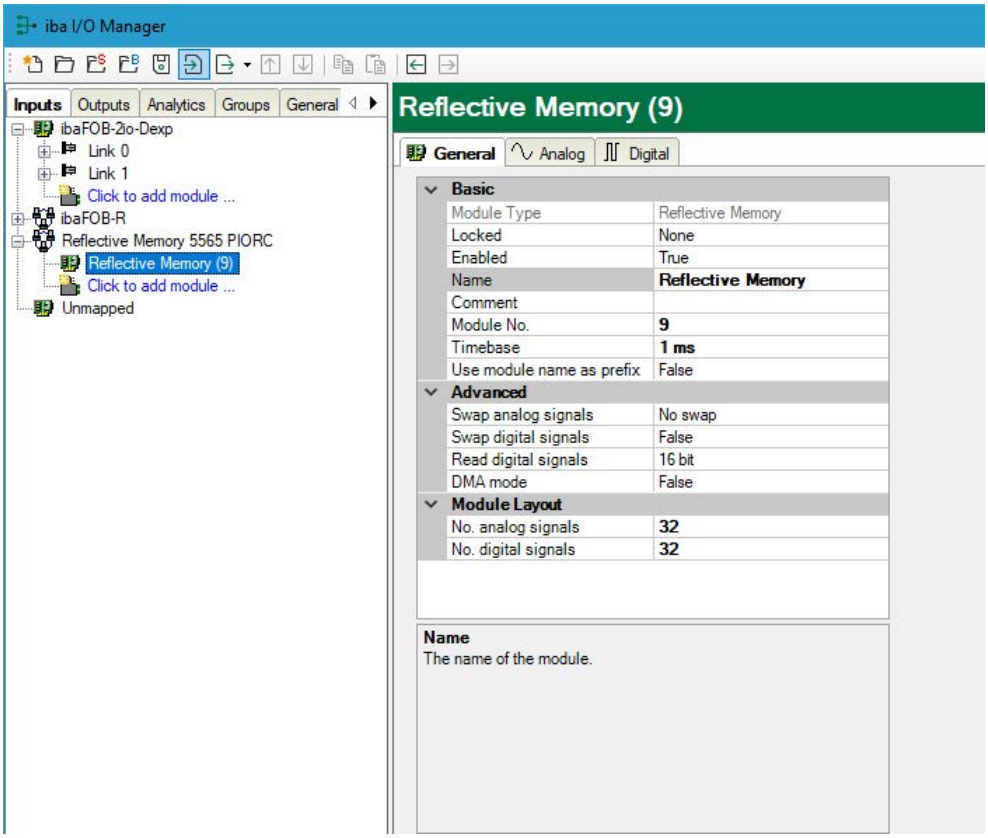
   Availability of module types depends on your licenses.

2. Select the desired module type and click <OK>.



3.2.3 Reflective Memory – General

All modules have the following common setting options.



Basic settings

Module Type (information only)
Indicates the type of the current module.

Locked
You can lock a module to avoid unintentional or unauthorized changing of the module settings.

Enabled
Enable the module to record signals.

Name
You can enter a name for the module here.

Comment
You can enter a comment or description of the module here. This will be displayed as a tooltip in the signal tree.

Module No.
This internal reference number of the module determines the order of the modules in the signal tree of *ibaPDA* client and *ibaAnalyzer*.

Timebase
All signals of the module are sampled on this timebase.

Use module name as prefix
This option puts the module name in front of the signal names.

3.2.4 Module type Reflective Memory

The module type *Reflective Memory* is used for collecting up to 1000 analog (real) and 1000 digital signals per module over a Reflective Memory connection. A selection of eight different data types is available for analog values:
BYTE, INT, DINT, WORD, DWORD, FLOAT, DOUBLE, FP_REAL.

The size of the module, i. e. the number of signals can be altered. Default setting is 32 A + 32 D signals. If you need more signals, just add them to the module or add another module.

3.2.4.1 Reflective Memory – General tab

For basic settings, see ↗ *Reflective Memory – General*, page 21

Advanced

Swap analog signals
Set the swap mode according to the signal source.
You can choose between the following 4 options:

Mode	16 bit	32 bit
No swap	AB	ABCD
Depending on data type	BA	DCBA
Swap 16 bit	AB	CDAB
Swap 8 bit	BA	BADC

The swap mode to be selected depends on the swap mode of the signal source.

Swap digital signals
Choose here whether the digital signals should be swapped on a 4-byte basis.

- False: no swap (default)
- True: byte order changes from access mode
  - for 16-bit access from AB to BA
  - for 32-bit access from ABCD to DCBA

Read digital signals
Select, how the digital signals should be fetched. Depending on your selection the swap mode, the addresses and bit numbers in the signal table *Digital* will be adapted automatically.

- 16 bit: addresses change in 2-byte steps, bit no. 0...15
- 32 bit: addresses change in 4-byte steps, bit no. 0...31

DMA mode (only for boards which support DMA, e.g. PCI/PCIE-5565PIORC/ibaFOB-R)
Enable the DMA mode in order to improve performance of the board and reduce the CPU load of the PC.

Asynchronous mode (only for boards which do not support DMA, e.g. PCI-5576)
In asynchronous mode, the data is copied from the card's memory into the memory of *ibaPDA* outside of the interrupt service routine (ISR). This mode can be used to measure large data volumes on a slower time base. If you want to activate the asynchronous mode, set this option on TRUE.

Module layout

Number of analog and digital signals
Here, you can increase or decrease the number of signals in the module. By default, 32 signals are preset. You may enter any value between 0 and 1000. The signal tables will be adjusted accordingly.

3.2.4.2 Reflective Memory – Analog tab

You can find a more detailed description of the following columns and some operating hints in the manual of *ibaPDA*, in chapter "Notes on working in the signal tables".

Name
Enter a cleartext name for each signal in the *Name* column. Up to two lines of comment may be entered for each signal in the column *Name.*

Open the comment dialog by clicking on the button in  the *Name* field of the signal.

Unit
Assignment of an engineering unit (such as Ampere, Volt, etc.) for the signal.

Gain and Offset
The values for gain and offset describe a linear characteristic curve for scaling. If incoming values are given in physical units, gain and offset can be ignored, i.e. set gain = 1 and offset = 0.

Gain and offset can be entered directly in the corresponding fields or by means of the two-point-scaling dialog with two pairs of applicable values.

You can open the two-point-scaling dialog with a click on the little tool button in the fields gain or offset. (Cursor must be on the fields to see the button  .

Address
In the *Address* column, the user can specify the byte offset of every single analog value in the Reflective Memory. The offset should be entered as decimal or hexadecimal values. In order to get some default values you may use the automatic fill function (see *ibaPDA* manual).

- Analog signals (Reflective Memory module) in FLOAT-format 4 Byte-steps
- Analog signals (Reflective Memory module) in INT16-format: 2 Byte steps
- Analog signals (Reflective Memory module) in BYTE-format: 1 Byte steps

Note

It is recommended to configure the data to be transmitted in consecutive memory ranges, i.e. the signals should have consecutive addresses. Otherwise a significant loss of performance might occur.

Data type
In the fields of this column, you can select the relevant data type used for each signal. Click in the corresponding field and select the data type from the drop-down list. The address space depends on the data type. Therefore, an adjustment of address entries might be necessary after changing the data types.

Available data types:

Data type	Description	Values Range
BYTE	8 bit without positive or negative sign	0 … 255
INT	16 bit with positive or negative sign	-32768 … 32767
WORD	16 bit without positive or negative sign	0 … 65535
DINT	32 bit with positive or negative sign	-2147483648 … 2147483647
DWORD	32 bit without positive or negative sign	0 … 4294967295
FLOAT	IEEE754; single precision; 32 bit floating point	±3,402823 E+38 ... ±1,175495 E-38
DOUBLE	IEEE754; double precision; 64 bit floating point	2.225E-308 … 1.798E+308
FP_REAL	Fixed point real; Q15.16; 15 integer bits and 16 fractional bits;	-32768 … 32767.9999

Activating channels
You can enable and disable every channel for acquisition with a mouse click.

Actual value
The fields in this column show the actual value of the signals. Even if the acquisition is not running yet the actual value may be displayed if the hardware is already connected and working (diagnostic feature).

3.2.4.3 Reflective Memory – Digital tab

You can find a more detailed description of the following columns and some operating hints in the manual of *ibaPDA*, in chapter "Notes on working in the signal tables".

Name
Enter a cleartext name for each signal in the *Name* column. Up to two lines of comment may be entered for each signal in the column *Name.*

Open the comment dialog by clicking on the button in  the *Name* field of the signal.

Address
This column is used for addressing each status word or double word in the Reflective Memory, depending on the access mode 16 bit or 32 bit.

Note

It is recommended to configure the data to be transmitted in consecutive memory ranges, i.e. the signals should have consecutive addresses. Otherwise a significant loss of performance might occur.

Bit No.
The number describes the position of the digital signal in the Reflective Memory range with reference to the offset address entry.

Addressing of bits depends on the access mode:

- 16 bit access mode: bits 0 to 15 of a status word
- 32 bit access mode: bits 0 to 31 of a double word

Activating channels
You can enable and disable every channel for acquisition with a mouse click.

Actual value
The fields in this column show the actual value of the signals. Even if the acquisition is not running yet the actual value may be displayed if the hardware is already connected and working (diagnostic feature). For digital signals, only the values 0 and 1 are shown.

3.2.5 Module type Reflective Memory dig512

The module type *Reflective Memory dig512* is used for collecting up to 32 * 16 = 512 digital signals per module over a Reflective Memory connection. The bits are packed in 16bit-integer values.

3.2.5.1 Reflective Memory dig512 – General tab

For basic settings, see ↗ *Reflective Memory – General*, page 21

Advanced

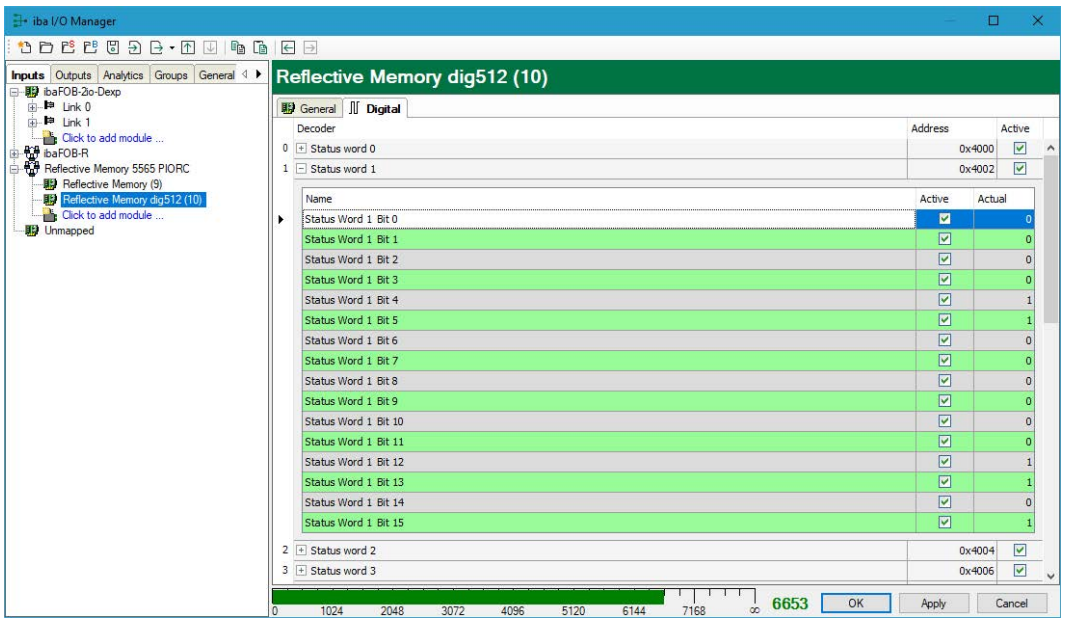
Swap digital signals
Choose here whether the digital signals should be swapped on a 4-byte basis.

- False: no swap (default)
- True: byte order changes from access mode
  - for 16-bit access from AB to BA
  - for 32-bit access from ABCD to DCBA

Asynchronous mode or DMA mode
See ↗ *Reflective Memory – General tab*, page 22 for more information.

3.2.5.2 Reflective Memory dig512 – Digital tab

The signal table for modules with dig512 format consist of two levels.



The first level shows the so-called decoders and activation attributes.

If you click on the small plus symbols in the table rows, the second level of the signal table opens and you can see the actual signals (16 per decoder).

Decoder level

Decoder
Following the principle of the former ibaDig512 device, the separate data packages are referred to as decoders. One decoder corresponds to an integer word with 16 bits.

You can give a cleartext name to the decoder in this column *Decoder*. This name is useful for technological assignment. Digital signals are grouped under each decoder on the second level.

Address
In this column enter the byte offsets of every signal in the Reflective Memory range. The default settings can or usually should be adapted.

Active
You can enable and disable every decoder for acquisition with a mouse click.

A click on the column heading *Active* enables and disables all the decoders at the same time. Individual decoders can be enabled with the decoder-specific checkbox. If you want to enable / disable the signals individually, you should do it on the second level. If activation of the signals of a decoder is not homogeneous, the activation checkbox of the decoder is displayed in gray.

Signal table

Name
Enter a cleartext name for each signal in the *Name* column. Up to two lines of comment may be entered for each signal in the column *Name.*

Open the comment dialog by clicking on the button in  the *Name* field of the signal.

Activating channels
You can enable and disable every channel for acquisition with a mouse click.

Actual value
The fields in this column show the actual value of the signals. Even if the acquisition is not running yet the actual value may be displayed if the hardware is already connected and working (diagnostic feature). For digital signals, only the values 0 and 1 are shown.

3.2.6 Module type Reflective Memory Text

Textual data (ASCII) may be transmitted to an *ibaPDA* system via a Reflective Memory connection as well. You should configure acquisition of the text in the I/O manager with a special text module.

Note

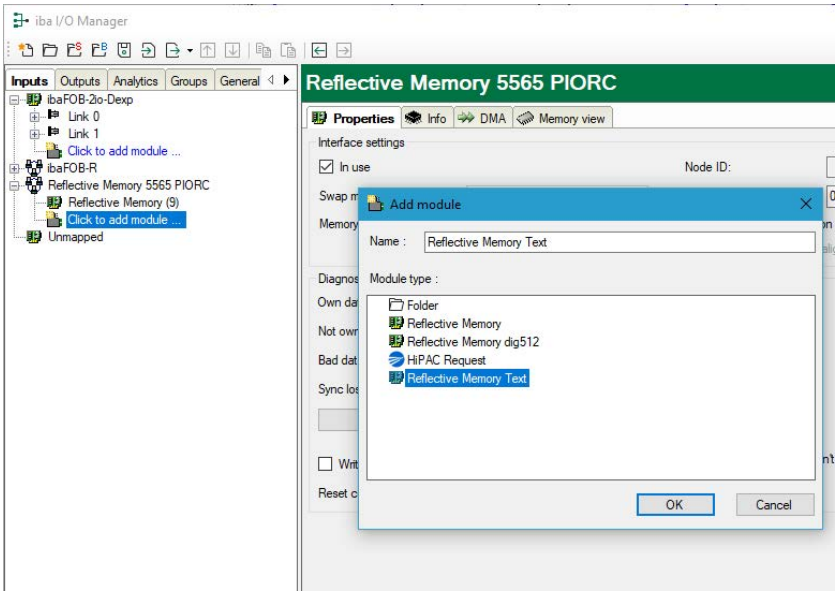
Since release of version 7 of *ibaPDA* the former “Technostrings” have been replaced by the facility of text modules and text signals.

I/O configurations of former *ibaPDA* versions (v6.x) can be converted automatically. For each Technostring a new text module is created to make sure that the further processing of texts in data files and analyses can remain unchanged.

More and general information about text signals can be found in the *ibaPDA* manual.

3.2.6.1 Add a text module

In the I/O manager click on *Click to add module...* beneath the Reflective Memory interface.



Select the module type *Reflective Memory Text* and click on <OK>.

3.2.6.2 General module settings

Basic settings

Module Type (information only)
Indicates the type of the current module.

Locked
You can lock a module to avoid unintentional or unauthorized changing of the module settings.

Enabled
Enable the module to record signals.

Name
You can enter a name for the module here.

Comment
You can enter a comment or description of the module here. This will be displayed as a tooltip in the signal tree.

Module No.
This internal reference number of the module determines the order of the modules in the signal tree of *ibaPDA* client and *ibaAnalyzer*.

Timebase
All signals of the module are sampled on this timebase.

Use module name as prefix
This option puts the module name in front of the signal names.

Text encoding
You can select the type of text encoding or the code page here for a correct interpretation and display of the received text data for inputs as well as of the text data to be sent for outputs. Available for selection are, beside system locale according to the Windows system settings (default) and UTF-8 Unicode, all other encodings.

Source:

Update time
This is the reading cycle for the text. The value must be equal or higher than the module time base (basic settings).

Swap mode
If swapping is required for correct reception, you can set it up here. Available for selection in the drop-down list are different swap modes. Which mode is the right one depends on the connected system.

Text offset
Enter here the offset of the beginning of the text within the memory range of the board (hexadecimal value).

Use counter
If you enable this option (True), then ibaPDA reads a 16 bit counter, which changes with every new text. This improves the performance because ibaPDA only needs to read the counter value (2 bytes) and not the entire text. Not before the counter has changed the entire text will be read. The counter has to be increased by the application in the source system with every new text sent.

This option enabled, an additional line for the counter offset appears. Enter here the address of the counter within the Reflective Memory address range (given as hex value).

Default value = 0x2000

Use terminator
Enable this option (True) if the text can have a variable length. If the option is set on “True” an additional line for the terminator character appears. Enter here the character which is used by the source system for termination of the text.

Default terminator is the Carriage Return character (ASCII code 13 dec)

Module layout

Number of analog signals

The default setting for the number of analog signals is 32. If required, you can change the number. Permissible range: 1 to 1000.

Processing

Delete new lines
If you activate this option (True), then all line feeds (‘new lines”) will be removed when parsing the input text.

Replacing characters
Enter a character here that is to replace all non-printable characters in the input text. Default: x.

Decimal point
Select the decimal separator here so that numerical values with decimal points in the text are correctly interpreted: Period or comma

Separating mode
Select the suitable mode here that corresponds to the input text structure in order to always correctly read out the information contained:

- Fixed width
- Delimiter
- JSON

Note

You'll find a comprehensive description of the split modes in the ibaPDA manual, part 2, chapter Text splitter module.

3.3 Configuration of the ibaPDA output modules

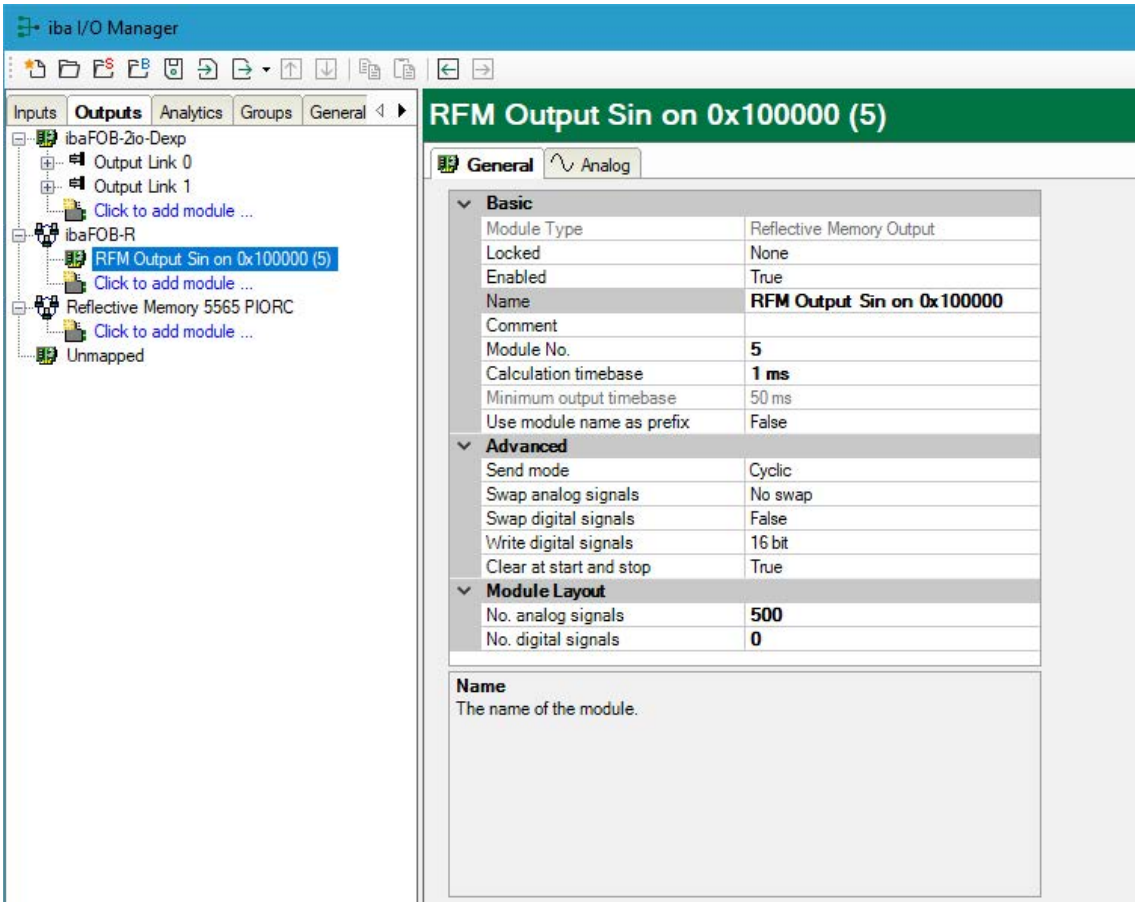
It is possible to write data from *ibaPDA* into the Reflective Memory. If all system requirements are fulfilled (see system requirements), then the interface, e.g. *Reflective Memory 5565 PIORC* or *ibaFOB-R*, will be shown in the tree structure within the I/O Manager's *Outputs* tab. No manual addition of the interface is required.

3.3.1 Add module

Add a module by clicking below the interface node in the tree and select the module type.

3.3.2 General module settings

In order to configure a module, mark it in the tree, select the *General* tab and make the required settings in the dialog.



The parameters are similar to those of the input modules.

For basic settings see ↗ *Reflective Memory – General*, page 21 and ↗ *Reflective Memory – General tab*, page 22

Calculation timebase
The timebase used for calculating output values. You can set this timebase independently of the general timebase and the timebase of the input modules. The sending of the output values is done with low priority and can be delayed and superseded by data acquisition tasks which always have higher priority since this is the core functionality of *ibaPDA*. The attempted minimum

output cycle time is independent from the calculation timebase. The minimum output cycle time is fastest **50 ms** or the least common multiple of all input timebases.

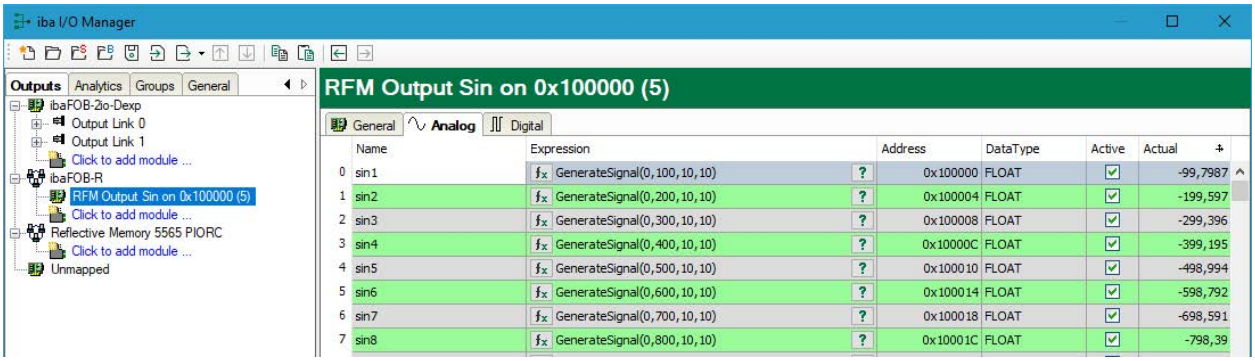
Check the current minimum output cycle time of your system in the I/O Manager in the *General* tab, in the *Module overview* node.

3.3.3 Signal configuration

You can configure the desired output signals in the column *Expression* on the tabs *Analog* and *Digital*, just like for the virtual signals. You can enter simple expressions or references to existing signals directly into the table or you open the expression editor dialog via the <fx>-button.

Tip

If you define the output data in a virtual module first and make just a reference to those data here, then you have the possibility to record these data in a data storage.



Configuration Reflective Memory - output signals

Name
In the *Name* column, enter a cleartext name for each signal.

Expression
Here, enter an expression or a reference to an existing signal or open the expression editor dialog via the <fx>-button. A wrong expression can be analyzed by clicking on the<?>-button.

Active
For disabled signals, the value 0 will be written to the message buffer.

Actual value
Display of the actual calculated value of the expression

Analog signals

Address
In the column "Address", you can enter the byte offset of the value inside the output telegram.

Data type
See ↗ *Reflective Memory – Analog tab*, page 23

Digital signals

Address, Bit-No.
This determines the offset of a value inside the output telegram.

With reference to the setting at *Write digital signals...* the address values and bit numbers in the signal table *Digital* will be adapted automatically.

- Writing as 16 bit: addresses change in 2-byte steps, bit no. 0...15
- Writing as 32 bit: addresses change in 4-byte steps, bit no. 0...31

If swapping is enabled for the module, then it applies to the writing of data as well:

- 16 bit: from AB to BA
- 32 bit from ABCD to DCBA

Note, that the result should be True or False, respectively 0 or 1, for digital signals.

4 Support and contact

Support

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Note

If you need support for software products, please state the number of the license container. For hardware products, please have the serial number of the device ready.

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