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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 issues or can be downloaded on the Internet.

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

<table>
<thead>
<tr>
<th>Issue</th>
<th>Date</th>
<th>Revision</th>
<th>Author</th>
<th>Version SW</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1</td>
<td>09-22-2016</td>
<td>New layout, new GCOM interface</td>
<td>RM</td>
<td>6.36.1</td>
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</tbody>
</table>

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1 About this Manual

This documentation contains a comprehensive description of the ibaPDA-Interface-GCOM software interface.

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

1.1 Target group and previous knowledge

This documentation addresses qualified professionals, who are familiar with handling electrical and electronic modules as well as communication and measurement technology. A person is regarded as a professional if he/she is capable of assessing the work assigned to him/her and recognizing possible 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 automation systems using ABB GCOM communication. For the handling of ibaPDA-Interface-GCOM 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:

<table>
<thead>
<tr>
<th>Action</th>
<th>Notation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Menu command</td>
<td>Menu Logic diagram</td>
</tr>
<tr>
<td>Calling the menu command</td>
<td>Step 1 – Step 2 – Step 3 – Step x</td>
</tr>
<tr>
<td></td>
<td>Example:</td>
</tr>
<tr>
<td></td>
<td>Select the menu Logic diagram - Add - New function block.</td>
</tr>
<tr>
<td>Keys</td>
<td>&lt;Key name&gt;</td>
</tr>
<tr>
<td></td>
<td>Example:</td>
</tr>
<tr>
<td></td>
<td>&lt;Alt&gt;; &lt;F1&gt;</td>
</tr>
<tr>
<td>Press the keys simultaneously</td>
<td>&lt;Key name&gt; + &lt;Key name&gt;</td>
</tr>
<tr>
<td></td>
<td>Example:</td>
</tr>
<tr>
<td></td>
<td>&lt;Alt&gt; + &lt;Ctrl&gt;</td>
</tr>
<tr>
<td>Buttons</td>
<td>&lt;Key name&gt;</td>
</tr>
<tr>
<td></td>
<td>Example:</td>
</tr>
<tr>
<td></td>
<td>&lt;OK&gt;; &lt;Cancel&gt;</td>
</tr>
<tr>
<td>File names, paths</td>
<td>&quot;Filename&quot;, &quot;Path&quot;</td>
</tr>
<tr>
<td></td>
<td>Example:</td>
</tr>
<tr>
<td></td>
<td>&quot;Test.doc&quot;</td>
</tr>
</tbody>
</table>
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:

- From an electric shock!
- Due to the improper handling of 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 specifies special requirements or actions to be observed.

Important note

Note if some special features must be observed, for example exceptions from the rule.

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.

Example

Configuration and application examples for a better understanding
2 System requirements

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

- *ibaPDA* V6.18.0 or more recent for using GCOM for ABB Stressometer
- *ibaPDA* V6.36.1 or more recent for using GCOM with the new Generic module.

**Note**

When updating an *ibaPDA* version <6.36.1 to a version ≥6.36.1., existing I/O configurations that use the older GCOM module types "start", "flatness", "stop" and/or "diagnose" are automatically converted into new GCOM generic modules.

- License for *ibaPDA*-Interface-GCOM
- A free Ethernet network interface, ideally exclusively for the GCOM network

**Note**

We recommend running the GCOM communication on a separate network. You might need another network adapter in order to prevent an influence of the Ethernet data traffic on the GCOM telegrams between *ibaPDA* and other nodes in the network (data server, data requests etc.).

For more prerequisites concerning the used PC hardware and the supported operating systems, please see the *ibaPDA* documentation.

License information

<table>
<thead>
<tr>
<th>Order no.</th>
<th>Product name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>31.001080</td>
<td><em>ibaPDA</em>-Interface-GCOM</td>
<td>Extension license for an <em>ibaPDA</em> system for the connection to an ABB master system via GCOM.</td>
</tr>
</tbody>
</table>

Table 1: Available GCOM-Interface licenses, as at *ibaPDA*-V6.36.1

If the "GCOM" 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 "Interface GCOM" has been properly recognized.

![Figure 1: Display of the license in the *ibaPDA* I/O manager, example GCOM](image.png)
References

1. *ibaPDA*-manual
   (see Website  http://www.iba-ag.com/de/support/downloads/ for the current issue)
2. ABB Master GCOM Multidrop User’s Guide 3BSE 000 165R0001
3. ABB Stressometer Flatness Logger User’s Manual V4.0 3BSE 000 350R0801
3 GCOM interface

3.1 General information

iba has implemented a NDIS driver to implement the ABB GCOM protocol.

The GCOM Multidrop bus (GCOM subnet) is a high-performance serial-synchronous half-duplex bus for medium communication distances.

The GCOM’s simple three-layer structure, multidrop bus connection and freedom from segmentation make it easy to implement in an external computer, see figure 2.

<table>
<thead>
<tr>
<th>Application Tasks</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>GCOM Flow Control</td>
<td>Transport</td>
</tr>
<tr>
<td>LLC IEEE 802.3</td>
<td>Data Link</td>
</tr>
<tr>
<td>MAC IEEE 802.3</td>
<td></td>
</tr>
<tr>
<td>PHY IEEE 802.3</td>
<td>Physical</td>
</tr>
</tbody>
</table>

Figure 2: 3-layer communication model

The protocol is implemented as a datalink user, operating on a standard IEEE 802.3 bus.

The multidrop bus has an IEEE 802.2 class 1 connectionless unconfirmed data link service. The bus has no specific master station, i.e. all stations have equal access to the bus.

The GCOM subnet has high security through the flow control and retransmission handling in the GCOM-layer.

Broadcast is not supported on the GCOM subnet.

On the ABB Master side, the GCOM communication software is implemented on a microprocessor-based communication board (DSCS 150 in MG 230/1 and MP 200/1, SC530 in AC 450).

The GCOM subnet (bus) can handle up to four (4) external computers on the same bus and the transmission rate can be up to 10 Mbit/s.

GCOM Multidrop provides a powerful communication link from external computers to the ABB Master system (MP200, AC450).
3.2 System topologies

Following drawing in figure 3 gives an overview of a possible configuration where 2 computers are connected to the ABB master GCOM network.

![Diagram of possible GCOM network topology]

Figure 3: Possible GCOM network topology
3.3 ibaPDA specific implementation

The individual messages from the ABB master to the ibaPDA system are sent using the Data Set Communication (DSC).

See the GCOM User manual chapter 3.5.4 for more details.

Since each data message contains up to 24 values of 32 bit, typically several data messages are sent for each logical message group. The ibaPDA driver buffers data messages until all parts of a logical message group have arrived before passing on the entire message to the general GCOM buffer in the ibaPDA driver.

The generic GCOM buffer has the following layout:

```c
typedef struct _MEMGCOM
{
    unsigned char   GCOMMessages[256][100];   // 256 messages of 100 bytes
    unsigned long   GCOMMessageCounter[256];  // 256 message counters
    unsigned long   GCOMGroupCounter[256];    // 256 message group counters
    unsigned long   GCOMOwnMacMessageCounter;
    unsigned long   GCOMIAmHereMessageCounter;
    unsigned long   GCOMNotOwnMacMessageCounter;
    unsigned long   SendCounterAck;
    unsigned long   SendCounterIAmHere;
} MEMGCOM, *PMEMGCOM;
```

The buffer holds 100 bytes of space for the last message of each possible message ID (according to the GCOM manual, the maximum message ID value is 255). When logical message groups are used, the latest message will only be updated once all message parts have been received. Also note that, because of this layout, logically grouped messages are not always guaranteed to reside in a contiguous buffer block (e.g. when a logical message group consists of messages 1, 3 and 5).

After the buffer block, there comes an array of 256 32-bit message counters; one for every message ID. Message counters are incremented regardless of logical message grouping.

After that, another array of 256 32-bit values represents logical message group counters.

Additionally, the following diagnose counters generated by the ibaPDA driver are also available:

- **GCOMOwnMacMessageCounter**
  The amount of data messages that are destined for the configured MAC address

- **GCOMIAmHereMessageCounter**
  The amount of received 'I am here' messages (both the ones sent by ibaPDA when in active mode as well as the ones received by other nodes)

- **GCOMNotOwnMacMessageCounter**
  Not recognized packets originating from a MAC address other than our own
- **SendCounterAck**
  - ACK messages sent when in active mode
- **SendCounterIAmHere**
  - 'I am here' messages sent when in active mode
3.4 Configuration and engineering ibaPDA

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

In case all requirements are met, (see System requirements, page 4), the GCOM interface will be displayed in the signal tree.

![GCOM-Interface in the I/O manager](image)

3.4.1 Interface configuration

As can be seen from figure 5, ibaPDA supports up to 4 GCOM links where for each link the following settings can be configured.

- **Active**
  
  With selection of active you decide whether this link is to be enabled or not.

- **Network Interface**
  
  Here you make a selection on which NIC (Network Interface Card) the GCOM link should operate. In the drop-down list all registered network interfaces are listed.

- **Mode**
  
  Here you decide whether this link should run in active or in passive mode:
  
  - **Active mode**: the ibaPDA system acts as an active GCOM node, sends acknowledge messages and sends cyclically "I am here" messages on the network.
    
    See the GCOM User’s manual chapter 1.8.4 -1.8.6 for more details.
  
  - **Passive mode**: the ibaPDA system is fully passive on the network, so only captures data without sending any messages on the network. This mode can be
used in order to operate an ibaPDA system in parallel with an existing flatness logger.

- Network ID
  Specify the ABB Master subnet that will be used to communicate with the ABB master system.

- ABB master node ID
  Specify the ABB master node used on your network.

- Logger node ID
  Specify the node ID of the ibaPDA system in the ABB Master subnet.

- Logger node MAC
  The network address to which the data messages are being sent by the ABB master. Note that this may differ from the actual MAC address of the NIC connected to the ABB network. The ibaPDA driver only interprets messages destined for this MAC address.

- Message grouping
  Define at this point the messages, which should be synchronized. For the definition use the characters as follows:
  - ",;" for separating two groups
  - ",," for separating two message IDs within a group

  Defining a range of message IDs within a group:
  Up to 256 groups with up to 32 messages each can be defined.
  Default setting: 80-83;85-87;89;90

**Note**

If using the same Network Interface for several links which operate in active mode, do not use the same settings for Network ID and Logger node ID. Failure to do so will lead to unpredictable results and to disturbances on the network caused by using the same MAC addresses.

### 3.4.2 Diagnostic Information on each individual GCOM link

By selecting an active link, a lot of diagnostic information is displayed, divided into three sections:

- Network adapter
- GCOM Configuration
- Message counters

**Network adapter**

![GCOM Link 1](image)

Figure 6: GCOM interface link, Diagnostics tab, selected network adapter
In this section, the selected “network interface” and the corresponding “NDIS name” is displayed.

The “active” field indicates whether this link is active or not.

The "Adapter is open" field should be 1, indicating that the NDIS driver embedded in the ibaPDA driver could open the network interface.

The “Adapter is bound” field equally should be 1, indicating the NDIS driver is bound to the selected network interface.

**GCOM Configuration**

![GCOM Configuration Table]

Figure 7:  GCOM interface link, Diagnostics tab, selection GCOM configuration

The parameters configured for this link are displayed here (see *Interface configuration*, page 10).

**Message counters**

![Message Counters Table]

Figure 8:  GCOM interface link, Diagnostics tab, section Message counters

Several diagnostic counters can be found in the *Message counters* section. This table contains three categories of counters, one category per group defined in the interface configuration node (see *Interface configuration*, page 10) and one category for messages that do not belong to a logical message group.
- **Error**
  - Sequence errors
    - Total number of messages received with a wrong sequence error.
    - An INIT_S message is sent to the ABB Master unit. The receive sequence counter is reset and the received data signal is dropped.
  - Retransmissions
    - Total number of retransmit messages received by ibaPDA. If a data message is received with the same sequence counter as the previous message, it is a retransmission of data by the ABB master. The data message is acknowledged by the ibaPDA system with the same sequence counter.

- **Sent messages**
  - ACK
    - Total number of ACK messages, which have been sent to the ABB master in "active" mode. When mode is "passive", the counter remains zero.
  - I am here
    - Total number of "I am here" messages sent by ibaPDA in "active" mode. These messages must be sent every second to build up a cross-reference table between station addresses on the GCOM subnet and logical addresses (network and node number) in the ABB Master system. When mode is "passive", the counter remains zero.

- **Received messages**
  - Total
    - Total number of messages received on the selected network interface.
  - Dropped
    - Total number of messages that could not be processed due to internal (memory allocation) problems.
  - GCOM data
    - Total number of GCOM messages received.
  - I am here
    - Total number of "I am here" messages received.
  - ACK
    - Total number of ACK messages received from the ABB master. This counter should remain at zero since ibaPDA never sends data messages to the ABB master.
  - INIT_R
    - Total number of INIT_R messages received from the ABB master. If an INIT_R message is received, it means that the ibaPDA receive sequence counter must be reset to 0 in order to resynchronize the sequence counters.
  - INIT_S
    - Total number of INIT_S messages received from the ABB master. If an INIT_S message is received, it means that the ibaPDA send sequence counter must be reset to 0 in order to resynchronize the sequence counters. This can normally not happen since ibaPDA does not send data messages to the ABB master.
  - Other data
    - Total number of non-GCOM messages received.

For each logical message group, a category is created in the table encompassing all defined message IDs (left column) with the respective number of received messages (right column). The category header shows the amount of complete logical messages that has been received (i.e. the minimum of all message ID counters in the group).
Message IDs that do not belong to any logical group are listed under the "Ungrouped messages" category.

Pressing the <Reset counters> button resets all counters to 0.

3.4.3 Memory view on each individual GCOM link
By selecting an active link and selecting the memory view tab, a hex viewer is shown. The viewer looks on the memory region MEMGCOM where the reassembled data messages and other diagnostic information are stored.

See chapter ibaPDA specific implementation Page 8 for the layout of the MEMGCOM structure

![Memory view of the link](image)

**Operation of the memory view**
A more experienced user can check the contents of memory address cells. Make a right mouse click in the area of the memory data display area and select To offset in the shortcut menu in order to enter a specific memory address you like to check. Click <OK> and the view will jump to the desired address (highlighted) and display the contents.

3.4.4 Add module
To add a module, click below the interface or right-click on the desired connection.

There is one type of modules you can add to the GCOM interface:

- GCOM generic

![Add module](image)
3.4.5 General module settings

![General module settings]

Figure 11: General module settings

**Basic settings**

- **Module type**
  Displays the module type of the current module.

- **Locked**
  A module can be locked for preventing accidental or unauthorized changes of the module settings.

- **Enabled**
  Disabled modules are excluded from signal acquisition.

- **Name**
  Here, the clear text name of the module designation has to be entered.

- **Module No.**
  Internal reference number of the module. The Module No. determines the order of the modules in the *ibaPDA* and *ibaAnalyzer* signal trees.

- **Timebase**
  All signals of this module are acquired with this timebase.

- **Use name as prefix**
  Puts the module name in front of the signal name.
Advanced

- Swap analog signals
  Set the swap mode according to the signal source.
  You can choose between four different options:

<table>
<thead>
<tr>
<th>Mode</th>
<th>16 bit</th>
<th>32 bit</th>
</tr>
</thead>
<tbody>
<tr>
<td>No swap</td>
<td>AB</td>
<td>ABCD</td>
</tr>
<tr>
<td>Depending on data type</td>
<td>BA</td>
<td>DCBA</td>
</tr>
<tr>
<td>Swap 16 bit</td>
<td>AB</td>
<td>CDAB</td>
</tr>
<tr>
<td>Swap 8 bit</td>
<td>BA</td>
<td>BADC</td>
</tr>
</tbody>
</table>

Table 2: Swap modes

The swap mode you can select depends on the swap mode of the signal source.

- Swap digital signals
  Here, you can select if you want to swap the digital signals on a 4-byte basis.
  - False: No swap (Default)
  - True: Changes the byte sequence from ABCD to DCBA

Tip

Leave the default setting "Depending on data type" unchanged.

Module Layout

- No of analog/digital signals
  Here, you can increase or decrease the signal scope of the module. The default setting are 32 signals. You can enter any value between 0 and 1000. The signal tables are adapted accordingly.
3.4.6 Signal configuration

On the tabs Analog and Digital you can respectively define the analog and digital signals to be mapped on the MEMGCOM structure. To determine the proper offset in the MEMGCOM structure, see iba specific implementation Page 8

The example in figure 11 shows a module that maps to the GCOM data message with ID 85. The start offset of a GCOM data message with ID \( n \), is defined as \( 100\times n \).

![Image of Analog signals]

- **Name**
  Here, a clear text name of the signal has to be entered.
  You can enter two comment rows in the Names column for every signal.
  You get to the comments with a mouse-click on the small button in the names field of the respective signal.

- **Unit**
  Assigns a physical channel dimension (e.g. °C, Ampere, Volt, N etc.)

- **Gain and offset**
  The gradient and the position of a linear scaling characteristic curve are determined using the values gain and offset (signal value in the zero point).
  You can enter the values directly or by means of the two-point-scaling with two known pairs of values.
  You get to the dialog of the two-point-scaling by clicking in the cell (Gain or Offset). Then, click on the little button .
Address
The address determines the offset of the first byte of this value within the MEMGCOM structure. The offset can be entered as hexadecimal or decimal values by selecting the desired setting in the context menu.

![Figure 13: Selecting decimal display of addresses](image)

In order to get some default values you may use the automatic fill function (see ibaPDA manual). The addresses will be incremented with regard to the data type.

- Analog signals as FLOAT-, DINT- or DWORD: in 4-byte steps
- Analog signals as INT or WORD: in 2-byte steps
- Analog signals as BYTE: in 1-byte steps
- Digital signals increase of Bit no. by 1, from 0 to 31, then increase of address by 4

Note
The addresses of the messages are derived from the message ID:
Address = Message ID * 100.
Example: Message ID 81 can be found at address 8100.

Data type
You can select the data type used for every signal in the fields of this column. Click in the respective field and choose the data type from the drop-down list. The address space is depending on the data type. Hence, an adjustment of address entries may be necessary after change of data types.

Possible data types:

<table>
<thead>
<tr>
<th>Data type</th>
<th>Description</th>
<th>Value range:</th>
</tr>
</thead>
<tbody>
<tr>
<td>BYTE</td>
<td>8-bit without sign</td>
<td>0 ... 255</td>
</tr>
<tr>
<td>INT</td>
<td>16-bit with positive or negative sign</td>
<td>-32768 ... 32767</td>
</tr>
<tr>
<td>WORD</td>
<td>16-bit without sign</td>
<td>0 ... 65535</td>
</tr>
<tr>
<td>DINT</td>
<td>32-bit with positive or negative sign</td>
<td>-2147483648 ... 2147483647</td>
</tr>
<tr>
<td>DWORD</td>
<td>32-bit without sign</td>
<td>0 ... 4294967295</td>
</tr>
<tr>
<td>FLOAT</td>
<td>IEEE754; Single Precision; 32-bit floating point value</td>
<td>1.175·10⁻³⁸ ... 3.403·10³⁸</td>
</tr>
<tr>
<td>DOUBLE</td>
<td>IEEE754; Double Precision; 64-bit floating point value</td>
<td>2.225E-308 ... 1.798E+308</td>
</tr>
<tr>
<td>FP_REAL</td>
<td>Fixed Point Real; Q15.16; 15 bits in Integer-Format and 16 bits in &quot;fractional&quot; format;</td>
<td>-32768 ... 32767.9999</td>
</tr>
</tbody>
</table>

Table 3: Data types
Activating the channels
Here, you can enable or disable the channels for the data acquisition with a mouse-click.

Actual value
Here, the actual value of the signal is displayed. Even, if the data acquisition is not running, yet, values may be displayed here, as they are read directly from the hardware. For digital signals, only the values 0 or 1 are displayed.
4  Support and contact

Support
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Email: support@iba-ag.com

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

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