

Q.series

# Manual

## Q.bridge



© 2015 Gantner Instruments GmbH

Operating instructions, manuals and software are protected by copyright. Copying, duplicating, translating, conversion into any electronic medium or into machine readable form, completely or partially, is only permissible with the expressed consent of Gantner Instruments GmbH. An exception is the making of a copy of software for one's own use for backup purposes, where this is technically possible and recommended by us. Infringements will be pursued in law and will be subject to compensation claims.

All trademarks and brand names used in this document only indicate the respective product or the proprietor of the trademark or brand name. The naming of products which are not from Gantner Instruments GmbH is made exclusively for informative purposes. Gantner Instruments GmbH makes no claims on trademarks or brand names other than its own.

---

# Table of Contents

<b>1</b>	<b>Safety Information .....</b>	<b>5</b>
1.1	Intended use .....	5
1.2	Checking for damage in transit .....	5
1.3	Personnel .....	5
1.4	Special risks .....	6
1.5	Siting locations .....	6
1.6	Modifications.....	6
1.7	Servicing and cleaning.....	6
1.8	Disposal.....	7
1.9	General hazards due to non-observance of the safety information.....	7
<b>2</b>	<b>Labels and Warning Information.....</b>	<b>9</b>
2.1	Warning information .....	9
2.2	Labels on the modules .....	9
2.3	Labels in this manual .....	10
<b>3</b>	<b>Introduction.....</b>	<b>11</b>
3.1	The documentation for Q.bridge.....	12
3.2	About this manual .....	12
3.3	System description.....	13
<b>4</b>	<b>Connection .....</b>	<b>15</b>
4.1	Connecting the power supply .....	15
4.2	Connecting digital I/Os .....	16
4.3	Status and flashing sequences of the Q.bridge LEDs .....	16
4.4	Connecting Q.bridge to the PC via Ethernet .....	18
4.4.1	Setting the Ethernet address (IP address) of the Q.bridge ..	18
4.4.2	Displaying Q.bridge module information .....	19
4.4.3	The Q.series Viewer.....	19
4.4.4	Setting the baud rate of the modules .....	21
4.5	Module flashing frequency.....	21
4.5.1	SOS.....	22
4.5.2	Problems during data transmission.....	22
4.5.3	LED displays in normal operation .....	23
4.6	The modules and their connection options .....	24

4.7	Q.brixx A101: Connecting sensors and I/O .....	26
4.7.1	Voltage .....	26
4.7.2	Current .....	27
4.7.3	Potentiometer .....	27
4.7.4	Resistance, Pt100, Pt1000 .....	27
4.7.5	Thermocouple .....	28
4.7.6	Full and half-bridge transducers .....	28
4.7.7	Strain-gauge quarter bridges .....	29
4.7.8	IEPE/ICP <sup>®</sup> sensor .....	29
4.7.9	Digital input and output.....	30
4.8	Q.brixx A102: Connecting sensors and I/O .....	31
4.8.1	Voltage .....	31
4.8.2	Current .....	32
4.8.3	Full and half-bridge transducers .....	32
4.8.4	Strain-gauge quarter bridges .....	33
4.8.5	IEPE/ICP <sup>®</sup> sensor .....	33
4.8.6	Analog output .....	33
4.8.7	Digital input and output.....	34
4.9	Q.brixx A104: Connecting sensors.....	35
4.9.1	Voltage .....	36
4.9.2	Thermocouple .....	36
4.10	Q.brixx A106: Connecting sensors and I/O .....	37
4.10.1	Full and half-bridge transducers .....	37
4.10.2	Strain-gauge quarter bridge .....	38
4.10.3	Inductive full and half bridges .....	38
4.10.4	LVDT, RVDT.....	39
4.10.5	Analog output .....	39
4.10.6	Digital input and output.....	40
4.11	Q.brixx A107: Connecting sensors.....	41
4.11.1	Voltage .....	42
4.11.2	Current .....	43
4.11.3	Potentiometer .....	43
4.11.4	Resistance, Pt100, Pt1000 .....	43
4.11.5	Thermocouple (only with terminal version).....	44
4.11.6	Full-bridge transducer .....	44
4.11.7	Strain-gauge half and quarter bridges .....	45
4.12	Q.brixx A108: Connecting sensors and I/O .....	47
4.12.1	Voltage .....	48
4.12.2	Current .....	48
4.12.3	Digital input and output.....	48
4.13	Q.brixx A109: Connecting I/O and outputs .....	49
4.13.1	Digital input and output, Plug 1 .....	49
4.13.2	Analog output, Plug 2 .....	50

4.14	Q.brixx A116: Connecting sensors .....	51
4.14.1	Full and half-bridge transducers .....	51
4.14.2	Strain-gauge quarter bridge.....	52
4.14.3	Activating the shunt resistance .....	53
4.15	Q.brixx A123: Connecting sensors .....	55
4.15.1	Voltage.....	56
4.15.2	Current .....	56
4.16	Q.brixx A124: Connecting sensors .....	57
4.16.1	Voltage.....	58
4.16.2	Thermocouple.....	58
4.17	Q.brixx A127: Connecting sensors .....	59
4.17.1	Voltage.....	60
4.17.2	Current .....	60
4.18	Q.brixx A128: Connecting sensors .....	61
4.18.1	Voltage.....	62
4.19	Q.brixx D101: Connecting I/O .....	63
4.19.1	Digital input and output .....	63
4.20	Q.brixx S104: Supply Module .....	66
4.21	Replacing a module.....	67
4.22	Replacing/changing the module type.....	68
4.23	Adding modules to or removing them from the system .....	68
<b>5</b>	<b>Configuration .....</b>	<b>69</b>
5.1	Configuration via ICP 100 .....	69
5.1.1	Installing the ICP 100.....	69
5.1.2	Setting communication parameters, establishing connection .....	70
5.1.3	Setting sensor parameters .....	71
5.1.4	Zero balancing/taring the sensor .....	74
5.1.5	Specifying digital inputs/outputs.....	76
5.1.6	Defining analog outputs .....	77
5.1.7	Defining computations .....	78
5.1.8	Specifying the alarm monitoring .....	80
5.1.9	Firmware update .....	81
<b>6</b>	<b>LabVIEW™ .....</b>	<b>83</b>
6.1	The Q.series driver VIs .....	83
6.1.1	Q.series_Initialize.vi .....	83
6.1.2	Q.series_Condition.vi.....	84
6.1.3	Q.series_Mode.vi .....	84
6.1.4	Q.series_ModuleLiveList.vi.....	84
6.1.5	Q.series_ChannelLiveList.vi .....	85
6.1.6	Q.series_ResourceList.vi .....	86

6.1.7	Q.series_Getlist.vi .....	86
6.1.8	Q.series_Samplerate.vi .....	86
6.1.9	Q.series_Start.vi.....	87
6.1.10	Q.series_WaitForValidData.vi .....	87
6.1.11	Q.series_Read.vi.....	87
6.1.12	Q.series_GetBacklog.vi .....	88
6.1.13	Q.series_Write.vi.....	88
6.1.14	Q.series_Stop.vi .....	88
6.1.15	Q.series_Clear.vi .....	89
6.2	The demo applications .....	90
6.2.1	Configuring Q.brixx modules with Q.bridge .....	90
6.2.2	Carrying out a measurement with the Q.brixx modules. ....	92
<b>7</b>	<b>Functional Procedures .....</b>	<b>95</b>
7.1	Ethernet on the PC .....	95
7.1.1	Finding the IP address and subnet mask of the PC .....	95
7.1.2	Setting the IP address on the PC .....	96
7.1.3	Allowing access to network devices (firewall) .....	98
7.2	Connecting sensors with sensing leads .....	100
7.3	Sensor scaling .....	101
7.3.1	Scaling of voltage signals and strain-gauge bridges .....	101
7.3.2	Scaling strain gauges.....	102
7.4	Current measurement with an external shunt.....	103
7.5	Measuring with thermocouples .....	104
<b>8</b>	<b>International Sales and Service .....</b>	<b>105</b>

# 1

## Safety Information

Before starting installation, setting up, operation and before maintenance work is carried out, it is essential to read and follow the appropriate warning and safety information given in this manual.

Installation, setting up, operation and maintenance of the modules or devices must take place as intended, i.e. under the conditions of use laid down in this manual and in the technical data for the relevant module or device.

### 1.1

#### Intended use

The products in the Q.series range are intended for use in industrial and experimental test engineering and for monitoring assembly and production processes. Transducers (sensors) for the acquisition of physical quantities such as voltage, current, resistance, temperature, force, displacement, torque, mass, strain and pressure can be connected. The modules are used exclusively for these kinds of measurement and control applications. Any application which goes beyond this scope does not fall within the intended use of the modules.

To ensure safe operation the modules and devices must only be operated according to the details given in the manuals and technical data sheets. In addition, the required legal and safety regulations covering the respective application must be followed. This applies in particular to the modules A123, A124, A127 and A128 with which input voltages of up to  $1200V_{DC}$  can be used.

### 1.2

#### Checking for damage in transit

On receipt of the goods visually check that the packaging and the module or device together with the data medium are intact. Also check the shipment for completeness (accessory parts, documentation, auxiliary aids, etc.). If the packaging has been damaged in transit or if you suspect that the product is damaged or may malfunction, the product must not be put into operation. In this case contact your customer consultant or Gantner Instruments GmbH.

### 1.3

#### Personnel

The installation, operation and maintenance of the modules or devices must only be carried out by competent persons. Competent persons are those who through their professional education have sufficient knowledge in the required field and are familiar with the relevant national occupational protection regulations,

accident prevention regulations, guidelines and accepted engineering rules. They must be able to reliably assess the results of their work and must be familiar with the contents of this manual. Electrical connections must only be carried out by specialist personnel trained for the task.

In particular, pay attention to the following:

- the national installation and erection regulations (e.g. ÖVE, VDE, etc.)
- generally accepted engineering rules
- the details on transport, installation, operation, servicing, maintenance and disposal in this manual
- the parameters, limits and the details about the operating and ambient conditions on the name-plates and in the data sheets.

## 1.4 Special risks

The modules A123, A124, A127 and A128 are specially designed for measurements at high voltages. Consequently, on the modules a voltage of up to 1200V may be present, which can lead to fatal or severe injury on touching the terminal contacts or bare parts of the connecting cables. Therefore, make sure that only qualified personnel have access to the modules or devices and that the voltages at modules can be switched off by a switch-disconnector or similar device for service purposes.

## 1.5 Siting locations

The devices in the Q.series range are protected to IP20 against water, dirt and small parts. If the ambient conditions require it, the modules can be fitted in water-protected or watertight housings.

Please note the admissible ambient temperatures specified in the technical data.

## 1.6 Modifications

Making modifications to the modules or devices is not permitted. Dirt and shrouding covers may only be removed for service and maintenance purposes.

## 1.7 Servicing and cleaning

The modules or devices do not need any servicing. Cleaning may only take place in the voltage-free state. Therefore follow the points below:

- Before cleaning, disconnect all connectors.
- Clean the housing with a soft, slightly moistened cloth. Never use any solvents, because these may attack the labels.
- When cleaning, make sure that no liquid enters into the device or goes onto the terminals.

Never attempt to repair nor to again operate devices which are defective, have developed a fault or are damaged. In this case it is essential to contact your customer consultant or Gantner Instruments GmbH.

## 1.8



### **Disposal**

Old devices which are no longer usable must be disposed of according to national and local regulations regarding environmental protection and raw-material recycling. Electronic components must not be disposed of with the household refuse. The packaging can be recycled and should therefore be passed into the recycling system. However, we recommend that the packaging is kept until the end of the warranty period so that you can pack faulty devices or modules properly.

## 1.9

### **General hazards due to non-observance of the safety information**

The modules or devices conform to the state of the art and are operationally safe. However residual risks may arise when they are used and operated improperly by untrained personnel.

Any person commissioned with the task of siting, operating, servicing or repairing a module or device in the Q.series must have read and understood the operating manual and in particular the information relating to safety.



# 2

## Labels and Warning Information

### 2.1

#### Warning information

To prevent personal injury and damage to property it is essential that you follow the warning and safety information given in this operating manual.



**Indicates a directly threatening hazard. If it is not prevented, the consequence will be fatal or serious injuries.**



Indicates a possibly hazardous situation. If it is not prevented, the consequence may be fatal or serious injuries.



Indicates a possibly hazardous situation. If it is not prevented, the consequence may be injuries of slight or medium severity.

**NOTICE**

Indicates a situation in which the consequence may be property damage if the information is not followed.

### 2.2

#### Labels on the modules

Symbol: **CE**

Meaning: This symbol is the CE marking. This shows that we guarantee that our product meets the requirements of the relevant EC directives.

Symbol: **CAT I, CAT II, CAT III**

Meaning: Modules with one of these symbols are intended for the connection of high voltage. The maximum admissible voltage is also given.

Symbol: 

Meaning: Modules with this symbol may be connected to high voltages. Connection shall only be made with isolated connectors designated for these applications.

## 2.3

### Labels in this manual

To simplify reading this manual we use the following labels and notation:

---

#### **IMPORTANT**

Paragraphs with this symbol give important information about the product or about using the product.

---



---

#### **Tip**

Contains application hints and other particularly useful information.

---

<i>italics</i>	signifies highlighted text
<b><i>interface</i></b>	signifies entries and entry fields in program user interfaces
<b>Options</b>	signifies menu items in the program user interfaces
>	signifies a sequence of menu items, e.g. in <b>Options &gt; Settings</b>
➔	indicates special features or restrictions

# 3

## Introduction

Dear Customer,

Thank you for purchasing a product in the Q.series from Gantner Instruments GmbH. We are sure that you have obtained an excellent product which will enable you to make fast and reliable measurements with low measurement uncertainties.

The manual is included in the items supplied. Keep the manual safe or download the latest version from our web site. To prevent personal injury and damage to property it is essential that you follow the warning and safety information given in this manual (Chapter 1, page 5). Please contact us if you do not know how to proceed even after reading the manual thoroughly.

If you find faults on the product or errors in the accompanying documentation or if you have suggestions for improvement, please contact your customer consultant or Gantner Instruments GmbH directly. We would be glad to receive your comments and ideas.

You will find further information in the section Technical Information in our Wiki at <https://dev.gantner-instruments.com/dokuwiki>. The user name is **support** and the password is **gins** (not all sections are open to the public). Alternatively, the Wiki from APP Instruments is also available to you: <http://support.app-instruments.com/dokuwiki>, User name **support**, Password **appins**.

### Austria

Gantner Instruments GmbH  
Montafonerstr. 4  
6780 Schruns/Austria  
Tel.: +43 (0) 55 56 77463-0  
Fax: +43 (0) 55 56 77463-300  
E-mail: [office@gantner-instruments.com](mailto:office@gantner-instruments.com)  
Web: [www.gantner-instruments.com](http://www.gantner-instruments.com)

### Germany

Gantner Instruments Test & Measurement GmbH  
Heidelberger Landstr. 74  
64297 Darmstadt  
Tel.: +49 (0) 6151 95136-0  
Fax: +49 (0) 6151 95136-26  
E-mail: [testing@gantner-instruments.com](mailto:testing@gantner-instruments.com)  
Web: [www.gantner-instruments.com](http://www.gantner-instruments.com)

## 3.1 The documentation for Q.bridge

The documentation for the Q.bridge consists of this manual about the Q.brixx modules A101, A102, A104, A106, A107, A108, A109, A116, A123, A124, A127, A128 and D101 as well as about the Q.bridge module.

You will find this manual also as a PDF file on our home page and on the Gantner CD enclosed with your system or which you can order free of charge from Gantner Instruments GmbH.

## 3.2 About this manual

This manual describes the installation, initial operation and the configuration of the modules Q.brixx A101, A102, A104, A106, A107, A108, A109, A116, A123, A124, A127, A128 and D101 with the Q.bridge module using the programs ICP 100, APPic Tool Suite and LabVIEW™ from National Instruments. The modules are differentiated through the number of their analog and/or digital inputs and outputs as well as by the maximum possible sample rate.

The manual is divided into several chapters:

- Safety information in Chapter 1, page 5ff.
- A description of the labels and symbols used on the modules and in this documentation can be found in Chapter 2 from page 9 onwards.
- You will find a description of the system and the main combination and expansion options in the next section.
- The description of the connection variants and the pin assignments on the inputs and outputs can be found in Chapter 4, *Connection*, ff. page 15.
- A comprehensive introduction to the configuration of the modules using the program ICP 100 is given in Chapter 5, *Configuration*, ff. page 69.
- An introduction to the VIs for LabVIEW™ and an explanation of the example program for LabVIEW™ can be found in Chapter 6, *LabVIEW™*, page 83.
- Explanations of the module measurement technology and background information can be found in Chapter 7, *Functional Procedures*, ff. page 95.

## 3.3

## System description

The modules in the Q.brixx series have been developed for industrial and experimental measurement and test engineering, in particular for multi-channel measurements of electrical, mechanical and thermal signals on engine and component test-rigs as well as for monitoring processes and long-term supervision. The modules A123, A124, A127 and A128 are specially designed for measurements at high voltages.



**Voltages of up to 1200V may be present on the connections of the modules A123, A124, A127 and A128.**

**Before connecting or disconnecting cables on these modules make sure that all sources of power are Locked Out.**

The individual modules can be combined to form one system as required. You can connect up to 16 modules to the Q.bridge module and then address them via a single interface.

On all modules the power supply, bus interface and the inputs and outputs are electrically isolated from one another.

#### Operating the modules via Q.bridge

The Q.bridge module has to be operated on the far left next to the Q.brixx modules (first slot). It must not be installed between the modules or to the right.

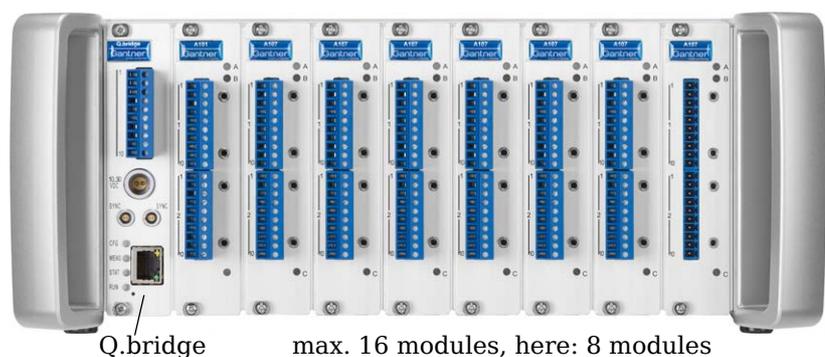


Abb. 3-1 Q.bridge with 8 modules.

Depending on the number and type of modules, transfer rates of, for example, 9 kHz per channel for four modules with a total of 24 channels are possible:

Number of modules	Number of channels	Transfer rates (min) per channel
4	2 x 8 + 2 x 4	9kHz
2	2 x 8	13kHz
4	4 x 1	28kHz
1	1 x 4	40kHz
1	1 x 1	74kHz

The maximum overall sample rate is currently approx. 220kSamples per second.

## 4

# Connection

This chapter contains the description of the connection variants and pin assignments.

## 4.1

## Connecting the power supply

For the power supply an unregulated direct voltage between 10 and 30volts is required, which is connected to the socket right at the bottom in the Q.bridge module. Abb. 4-1 shows the pin assignment. Each module requires a power of approx. 2W in addition to the power supplied for the connected transducers. The power required is almost constant over the complete voltage range.

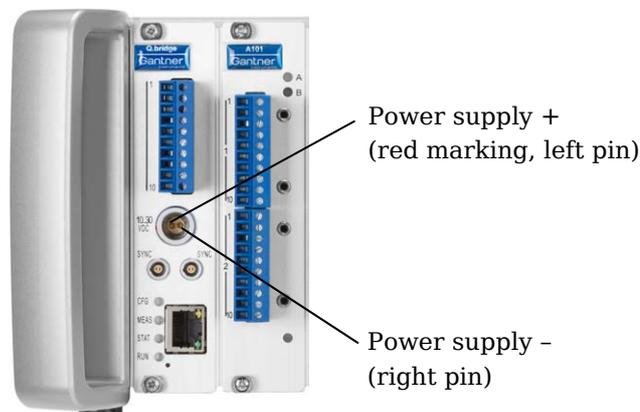


Abb. 4-1 Pin assignment on the power supply socket.

### **i** IMPORTANT

When the modules are switched on, there is an increase current demand until the modules are operating in a stable manner: In the start-up phase up to 700mA (10ms) per module is needed depending on the supply voltage. Thereafter, you should expect approx. 500mA per module for a 10V supply voltage, with a 30V supply voltage approx. 170mA. You should therefore use power supply units which can supply the required peak power on switching on the voltage.

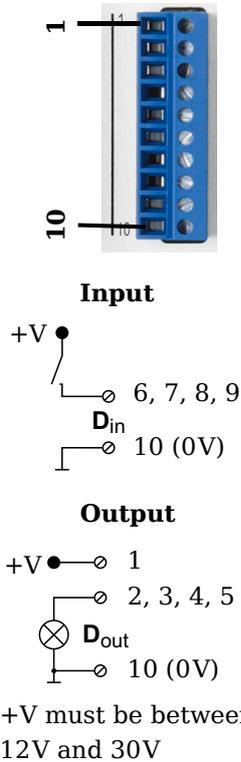
The modules have internal protection against brief excessive voltages and currents and against short-term connection with incorrect polarity.

- ➔ Do not use cable which is too thin for the connection so that the required power can be transferred to the module without significant losses.

## 4.2

### Connecting digital I/Os

The digital I/Os are accessible via the front panel. The table shows the terminal assignment on the Q.bridge.



Conne- tion	Assign- ment	Remarks
1	+V	External supply voltage for the digital outputs (12V ... 30V)
2	D <sub>Out</sub> 1	Low: Output active
3	D <sub>Out</sub> 2	Low: Output active
4	D <sub>Out</sub> 3	Low: Output active
5	D <sub>Out</sub> 4	Low: Output active
6	D <sub>In</sub> 1	Low: Input active
7	D <sub>In</sub> 2	Low: Input active
8	D <sub>In</sub> 3	Low: Input active
9	D <sub>In</sub> 4	Low: Input active
10	0V	I/O ground potential

## 4.3

### Status and flashing sequences of the Q.bridge LEDs



CFG (configuration)	
Off	The Q.bridge is in the Measurement mode.
Flashing, approx. 0.5s on and 0.5s off (1 Hz) and LED MEAS is off	The Q.bridge is in the Transparent mode.
On	The Q.bridge is in the Configuration mode or a connection is established in the Transparent mode.
MEAS (Measurement)	
Off	The Q.bridge is not in the Measurement mode.
Flashing, approx. 0.2s on and 0.8s off	The Q.bridge is in the Measurement mode but not yet initialized.

Flashing, approx. 0.8s on and 0.2s off	The Q.bridge is in the Measurement mode and initialized.
<b>MEAS (Measurement)</b>	
Flashing, approx. 50ms on and 50ms off	Error during initialization
On	The Q.bridge is in the Measurement mode.
<b>STAT (Status)</b>	
On	The self-test is running which is carried out after switch-on.
<b>RUN (power supply)</b>	
On	The power supply is switched on.
Off	There is no power supply present.

### Special cases

MEAS and CFG flashing alternately, each approx. 0.1s on and 0.1s off	The modules are still booting and the Q.bridge is not ready.
MEAS flashes, approx. 0.6s on and 0.1s off and CFG flashes, approx. 0.1s on and 0.6s off	One or more modules are using a baud rate different to the Q.bridge; refer to Section 4.4.4, page 21.
MEAS and CFG flash 3 times short and 3 times long (SOS)	The system cannot be started. There is an error in the system or framework. If the error is still present after restarting, please contact the Gantner support; refer to Chapter 8, <i>International Sales and Service</i> , page 105.

### Boot sequence

RUN is continuously lit after switching on the power supply. Then STAT lights and goes out again, then MEAS lights and goes out again and finally CFG flashes to indicate that the Q.bridge is in the Transparent mode.

➔ Refer also to Section 4.5, *Module flashing frequency*, page 21.

## 4.4

### Connecting Q.bridge to the PC via Ethernet

For communication (configuration and data interchange) with the modules you must connect the Q.bridge module via Ethernet to a PC. Use a cross cable for the direct connection or connect the PC and Q.bridge using an Ethernet switch.

---

**i Tip**

We recommend the use of cables to Cat-5e or better.

---

The Q.bridge module uses a permanent IP address: 192.168.1.23. With the program APPic Tool Suite you can set the IP address and subnet mask of the Q.bridge to a value suitable for your network. Alternatively, you can set your PC (at least temporarily) to an Ethernet address in the same network segment, i.e. the first three groups of numbers in the IP address must match. Refer to Section 7.1, *Ethernet on the PC* on page 95 for the display and setting of the PC IP address and subnet mask.

---

**i Tip**

We recommend the use of industrial Ethernet switches. The Q.bridge module uses autonegotiation and operates, if available, with 100Mbit/s and full duplex for the transmission.

---

### 4.4.1

#### Setting the Ethernet address (IP address) of the Q.bridge

##### Procedure

1. Make sure that the current version of the software APPic Tool Suite.exe is installed on your PC.  
You will find the current version in the download section of our home page. If necessary, install the current version; refer to Section 5.1 on page 69.
2. Start the software.
3. Using the context menu **Scan Network For Devices** (click on an empty row in the table) start the search for the connected Q.bridge.
4. You must have the appropriate access rights to be able to change the IP address: Menu **File > Login**.
5. Use **user** as the **User name** and **user** as the **Password**.  
The user name and password are used to prevent unintentional changes. Changing the name or password is not necessary and is also not intended.

6. Mark the Q.bridge, the address of which is to be changed and via the context menu **Configure Network Settings** call up the dialog for changes.
7. Enter the required address at **IP Address** and click on **Apply and Reboot**.  
If necessary, you can also change the subnet mask here. In the case of doubt, consult your network administrator.
8. Using the context menu **Scan Network For Devices**, start a new search. The Q.bridge module should now be shown with the new IP address.

#### Example

Chosen new IP address of the Q.bridge: 192.168.169.85

Possible PC IP address: 192.168.169.10

Subnet masks of the PC and module: 255.255.255.0

#### 4.4.2

#### Displaying Q.bridge module information

Mark the Q.bridge in the list in the Real-Time Target Configurator and select **Show Device Info** from the context menu. The following dialog contains information about the serial number, MAC address and the framework and application versions of the module.

Using the context menu **Show Installed Software**, you obtain comprehensive information about the installed software modules.

#### 4.4.3

#### The Q.series Viewer

The program APPic Tool Suite offers you the possibility of viewing the configuration of your system and of graphically displaying measurements from the modules.

Call the Q.series Viewer using the Q.bridge context menu **Show in Q.series Viewer** so that the correct IP address is already entered in the following window. If you call the viewer via the **View** menu, you must enter the correct address manually. Then click on **Connect**.

In the following window you see the connected modules with hardware and software versions as well as the channels present in the modules (Fig. 4-2).

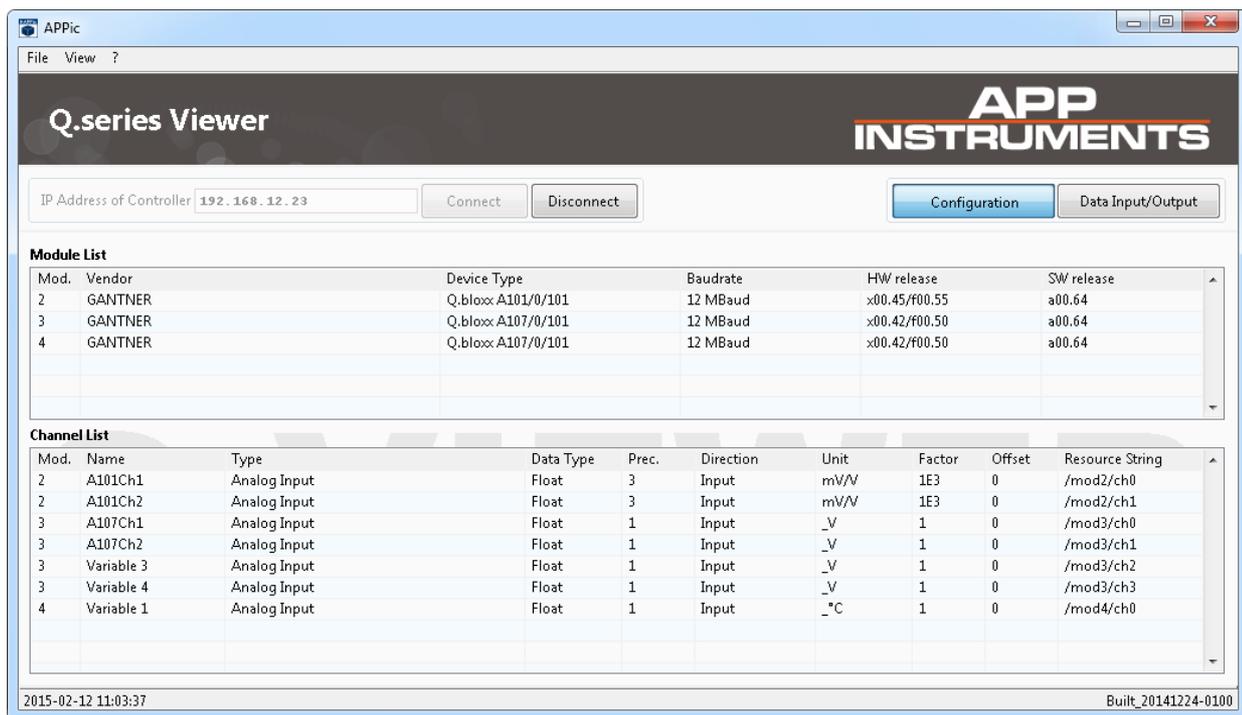


Abb. 4-2 Q.series Viewer, configuration view.

Using **DataInput/Output**, you can switch over to a graphical display showing up to four channels (Fig. 4-3). You select the channels to be displayed on the left side and click on **Start**. You can define the transfer parameters using **Samplerate** and **Block-size**. In the **Backlog** field you can see how many values are in the output buffer. The value should be smaller than that for **Block-size** and not larger, because otherwise the transfer takes place too slowly and values are lost if the buffer overflows.

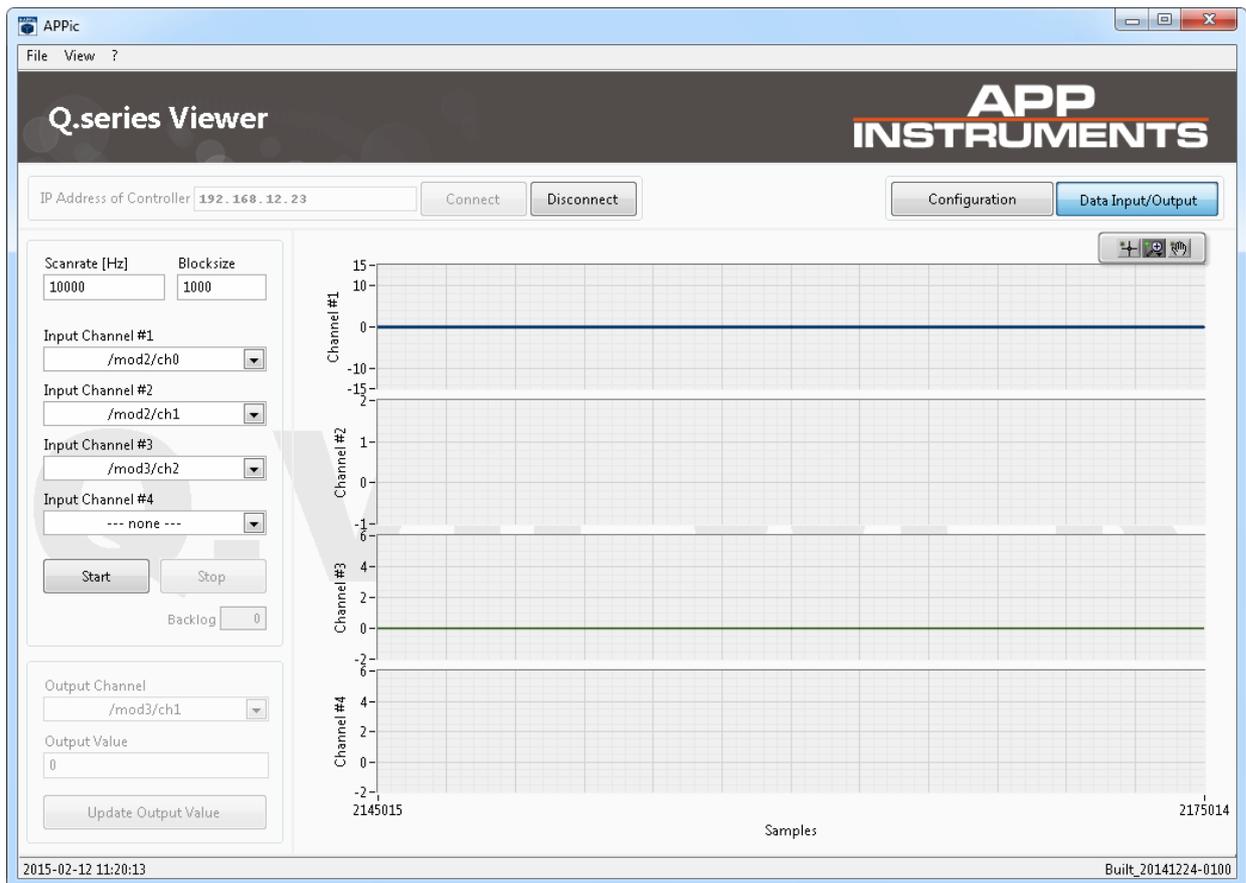


Abb. 4-3 Q.series Viewer, graphical display.

You can initiate the output of values after the start via **Output Channel**, **Output Value** and **Update Output Value**.

#### 4.4.4

#### Setting the baud rate of the modules

The baud rate of the modules must be set to 12 MBd for the proper functioning of the Q.bridge. If the modules have been used elsewhere, e.g. in a Q.brixx system where a different baud rate was set, you have to change the baud rate.

##### Procedure

1. Call the Q.series Viewer (refer to Section 4.4.3).
2. Mark the relevant module.
3. Select **Set Module Baud Rate** from the context menu.
4. Set 12 MBd and click on **Apply**.

## 4.5

### Module flashing frequency

The modules have three LEDs: one blue LED on the upper edge (A) and one red LED per connector strip (B and C). In normal

operation the blue LED lights when the module is addressed via LabVIEW™ or an application; otherwise the blue LED flashes. Normally, the red LEDs do not light. Depending on the error, the red LED of the affected connector strip or the blue LED lights or all LEDs flash in a certain order. In the following illustrations a short dash corresponds to short flash and a long dash to a long flash.

Refer also to Section 4.3, *Status and flashing sequences of the Q.bridge LEDs*, page 16.

#### 4.5.1

#### SOS

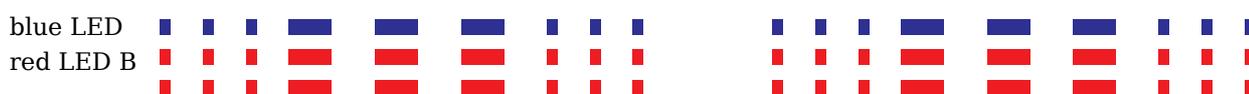


Abb. 4-4 *Flashing sequence with an incorrect module or when there are no settings in the base.*

Cause: The configuration saved in the base does not match that in the module.

There may be two reasons for this:

1. There is no configuration in the base yet.
2. The module type saved in the base configuration differs from the plugged-in module, therefore the configuration cannot be accepted.

Consequently, either change the module for the correct module type or reconfigure the module (Chapter 5, *Configuration*, page 69). The (new) configuration is then automatically saved in the base.

#### 4.5.2

#### Problems during data transmission



or



Abb. 4-5 *Flashing sequence for problems during the data transmission.*

These flashing sequences indicate a problem with the communication.

Restart the system (by switching off, waiting one minute and then switching on again). If these measures do not rectify the error, a hardware fault is probably present. Contact your customer consultant or Gantner Instruments GmbH directly.

### 4.5.3

#### **LED displays in normal operation**

For modules with analog inputs a red illuminated LED indicates that the measurement range has been exceeded on at least one input. You can suppress this indication in the module configuration.

For modules with digital inputs or outputs an orange illuminated LED indicates that an input or output is active.

## 4.6

## The modules and their connection options

The following table gives you an overview of the various modules: sensor types that can be connected, signal outputs, the number of input channels, etc.

Modules:	A101	A102	A104	A106	A107	A108	A109	A116	A123	A124	A127	A128	D101	S104
Signal inputs														
Voltage	X	X	X		X	X			X	X	X	X		
Current	X	X			X	X								
Potentiometer	X				X									
Resistance	X				X									
Pt100, Pt1000	X				X									
Thermocouple	X		X		X					X				
(Strain gauges) full + half bridge	X	X		X	X <sup>(1)</sup>			X						
Strain-gauge quarter bridge	X <sup>(2)</sup>	X <sup>(2)</sup>		X <sup>(2)</sup>	X <sup>(2)</sup>			X						
Inductive full and half bridge				X										
LVDT, RVDT				X										
IEPE/ICP® Sensor	X	X												
Digital input: frequency, pulse width, counter							X						X	
Digital input: status	X	X		X		X	X						X	X

Modules:	A101	A102	A104	A106	A107	A108	A109	A116	A123	A124	A127	A128	D101	S104
Signal outputs														
Voltage		X		X			X							
Current		X					X							
Digital output: frequency, pulse width							X						X	
Digital output: Sta- tus	X	X		X		X	X						X	
Number of chan- nels	2	1	8	2	4	8	4	8	4	4	4	4	8	
Data rate (in Hz)	100k	100k	100	10k	10k	10k	100k	10k	100k	10k	100k	100k	up to 100k	
For description refer to page	26	31	35	37	41	47	49	51	55	57	59	61	63	66

1) Half bridge only with Q.brixx Terminal or adapter plug

## 4.7

### Q.brixx A101: Connecting sensors and I/O

The Q.brixx Module A101 has two electrically isolated analog inputs and two digital inputs or outputs. The pin assignment of the two connector strips is identical and the connection terminals have numbers for identifying the connections.

GND identifies the measurement ground of an input, 0V and +V refer to the (external) supply voltage connections. Measurement ground and (module) supply voltage are electrically isolated in the module.

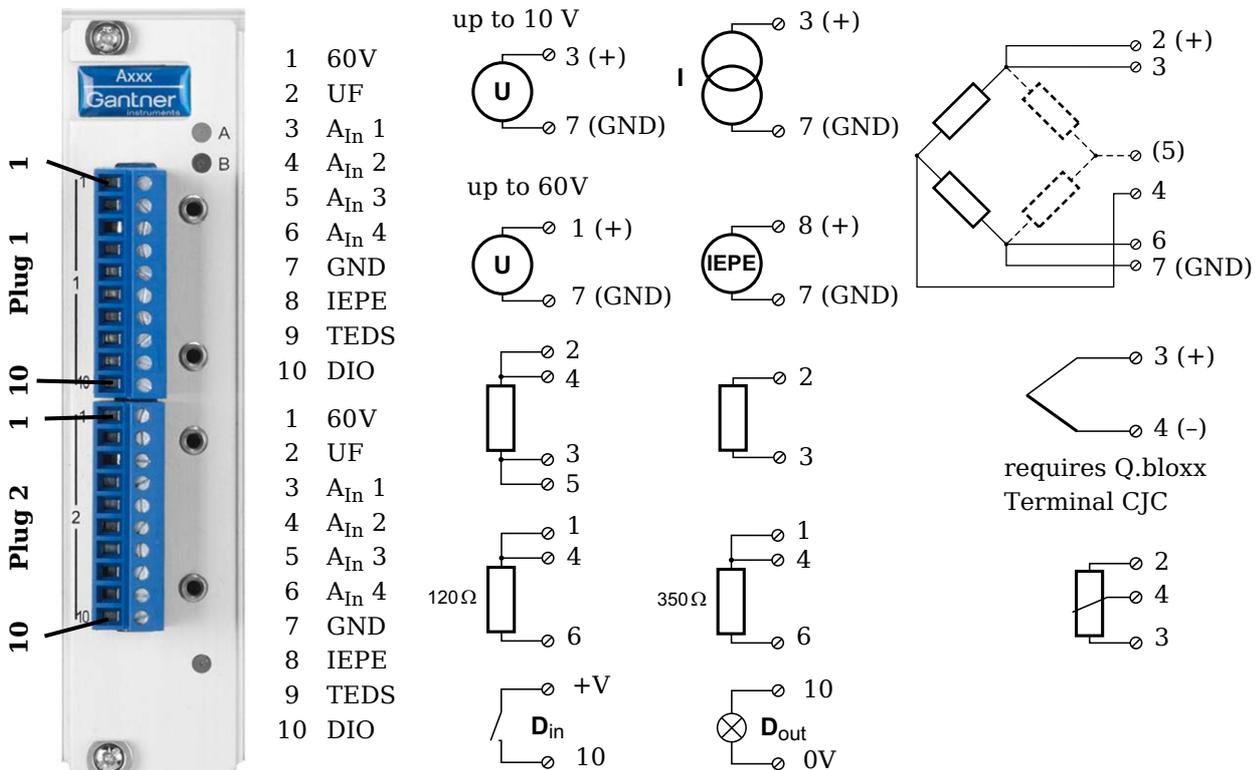


Abb. 4-6 Pin assignment for Q.brixx Module A101.

**i Tip**

Further information on transducers and sensors can also be found in Chapter 7 ff. page 95.

#### 4.7.1

#### Voltage

With voltage measurements two connection variants are possible, depending on the level of the voltages to be measured: up to 10V and up to 60V.

**i IMPORTANT**

Voltages which exceed the admissible limits produce incorrect measurement data, because the inputs are protected against overvoltages and limit the input voltage.

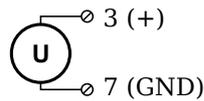
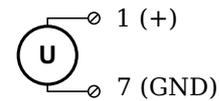
**Voltages up to 10V****Voltages up to 60V**

Abb. 4-7 A101, measurement of voltage.

## 4.7.2

**Current**

A shunt resistance of  $50\Omega$  is integrated into the Q.brixx Module A101 for current measurement. This facilitates the measurement of currents of up to 25mA. For higher currents use a voltage measurement and an external shunt; refer to Section 7.4, page 103.

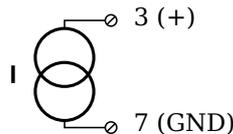


Abb. 4-8 A101, measurement of current.

## 4.7.3

**Potentiometer**

Potentiometers with resistances between  $1\text{ k}\Omega$  and  $10\text{ k}\Omega$  are connected in a three-wire configuration.

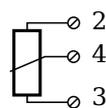


Abb. 4-9 A101, measurement with potentiometers.

## 4.7.4

**Resistance, Pt100, Pt1000**

You can connect resistances and Pt100/1000 probes in two-wire or four-wire circuits. You specify the selected type of circuit during the module configuration (**Type** column).

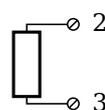
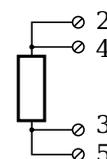
**2-wire circuit****4-wire circuit**

Abb. 4-10 A101, measurement of resistance and Pt100/1000 probes.

---

**i Tip**

Information about the types of circuit and the respective advantages and disadvantages can be found in Section 7.2, *Connecting sensors with sensing leads*, page 100.

---

## 4.7.5

**Thermocouple**

For connecting thermocouples you need a special connecting plug which contains the comparative measuring point (cold point compensation) required for thermocouples. The plug can be obtained under the designation Q.bloxx Terminal CJC-A101 from Gantner Instruments GmbH. You can connect the following types of thermocouple: B, E, J, K, L, N, R, S, T and U.

Alternatively, you can also use two thermocouples or a reference temperature source.

---

**i Tip**

You will find information on the comparative measuring point and on the measurement with a reference temperature source in Section 7.5, *Measuring with thermocouples*, page 104.

---

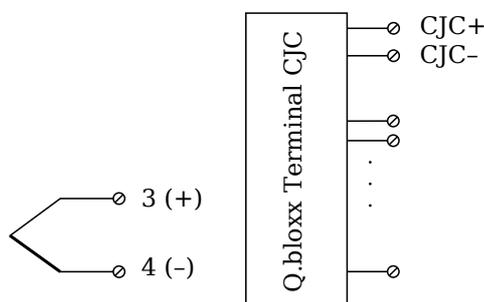


Abb. 4-11 A101, measurement with thermocouple using Q.bloxx Terminal CJC-A101.

## 4.7.6

**Full and half-bridge transducers**

With (resistive) full bridges (strain-gauge full bridges) all connections are occupied. If the sensor has no sensing leads, you specify this during the module configuration (**Type** column). With half bridges the side drawn in dashes and the connection 5 are omitted.

The bridge excitation voltage is 2.5V.

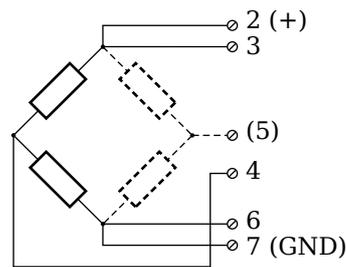


Abb. 4-12 A101, measurement with full and half bridges.

**i Tip**

Information about the types of circuit and the respective advantages and disadvantages can be found in Section 7.2, *Connecting sensors with sensing leads*, page 100.

#### 4.7.7

### Strain-gauge quarter bridges

For the connection of strain-gauge quarter bridges you need a special connecting plug which contains the completion resistances. The plug can be obtained under the designation Q.bloxx Terminal B4/120-A101 with 120Ω or B4/350-A101 with 350Ω from Gantner Instruments GmbH.

The bridge excitation voltage is 2.5V.

**i IMPORTANT**

The plug must have the same resistance values as the strain gauges used, because otherwise no measurement is possible. Since, for reasons of stability, all necessary completion resistances are located in the Q.bloxx Terminal, you have to select a full bridge circuit as the bridge type for the channel.

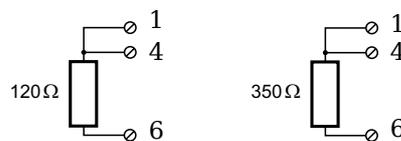


Abb. 4-13 A101, measurement with strain-gauge quarter bridge using Q.bloxx Terminal B4.

#### 4.7.8

### IEPE/ICP<sup>®</sup> sensor

The sensor is supplied with 4 mA of current from the module (current supply).

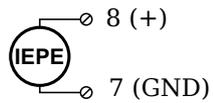


Abb. 4-14 A101, measurement with IEPE or ICP<sup>®</sup> sensors.

### 4.7.9

#### Digital input and output

On each connecting plug a contact is available for an input or output. You can use the appropriate function depending on the wiring.



Abb. 4-15 A101, digital input and output.

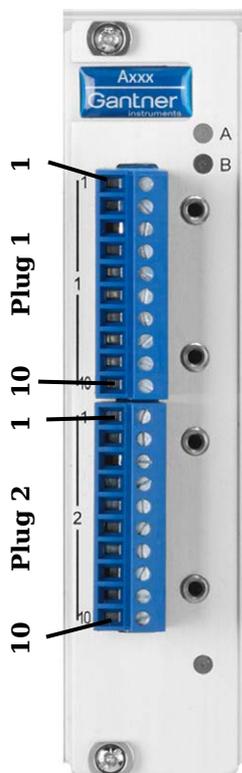
The digital input is active (high level) when the applied signal voltage lies above the threshold of 10V.

## 4.8

## Q.brixx A102: Connecting sensors and I/O

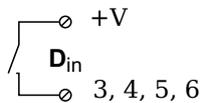
The Q.brixx Module A102 has one electrically isolated analog input, one analog output and two digital inputs or outputs electrically isolated from the analog section. The assignment of both connector strips is *not* identical. The plug number is specified in the following. The connection terminals have numbers for identifying the connections.

GND identifies the measurement ground of an input, 0V and +V refer to the (external) supply voltage connections. Measurement ground and (module) supply voltage are electrically isolated in the module.

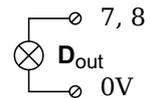
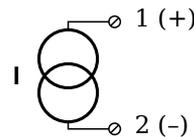
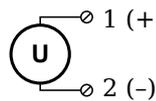


- |    |                   |
|----|-------------------|
| 1  | A <sub>Out+</sub> |
| 2  | A <sub>Out-</sub> |
| 3  | DI 1              |
| 4  | DI 2              |
| 5  | DI 3              |
| 6  | DI 4              |
| 7  | DO 1              |
| 8  | DO 2              |
| 9  | A <sub>MUX</sub>  |
| 10 | B <sub>MUX</sub>  |

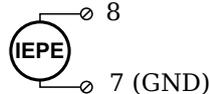
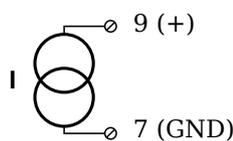
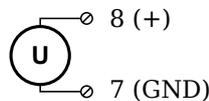
## Plug 1, inputs



## Plug 1, outputs



## Plug 2, inputs



- |    |                   |
|----|-------------------|
| 1  | U <sub>Exc+</sub> |
| 2  | U <sub>Sen+</sub> |
| 3  | U <sub>Sig+</sub> |
| 4  | U <sub>Sig-</sub> |
| 5  | U <sub>Sen-</sub> |
| 6  | U <sub>Exc-</sub> |
| 7  | GND               |
| 8  | U <sub>In</sub>   |
| 9  | I <sub>In</sub>   |
| 10 | TEDS              |

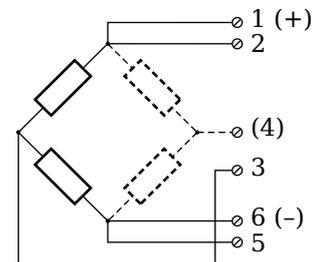


Abb. 4-16 Pin assignment for Q.brixx Module A102.

**i** Tip

Further information on transducers and sensors can also be found in Chapter 7 ff. page 95.

## 4.8.1

## Voltage

You can measure voltages of up to 10V via Plug 2.

**i IMPORTANT**

Voltages which exceed the admissible limits produce incorrect measurement data, because the inputs are protected against overvoltages and limit the input voltage.

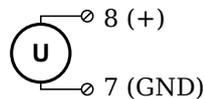


Abb. 4-17 A102, measurement of voltage, Plug 2.

### 4.8.2

#### Current

A shunt resistance of  $50\Omega$  is integrated into the Q.brixx Module A102 for current measurement. This facilitates the measurement of currents of up to 25 mA via Plug 2. For higher currents use a voltage measurement and an external shunt; refer to Section 7.4, page 103.

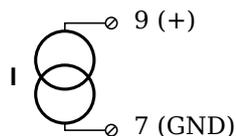


Abb. 4-18 A102, measurement of current, Plug 2.

### 4.8.3

#### Full and half-bridge transducers

With (resistive) full bridges (strain-gauge full bridges) all connections are occupied. If the sensor has no sensing leads, you specify this during the module configuration (**Type** column). With half bridges the side drawn in dashes and the connection 4 are omitted.

The bridge excitation voltage is switched via software between 1V, 2.5V, 5V and 10V.

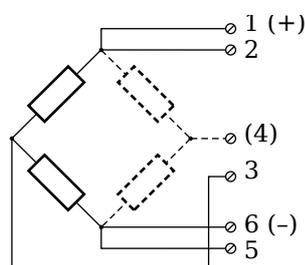


Abb. 4-19 A102, measurement with full and half bridges, Plug 2.

**i Tip**

Information about the types of circuit and the respective advantages and disadvantages can be found in Section 7.2, *Connecting sensors with sensing leads*, page 100.

**4.8.4****Strain-gauge quarter bridges**

For the connection of strain-gauge quarter bridges you need a special connecting plug which contains the completion resistances. The plug can be obtained under the designation Q.bloxx Terminal B4/120-A102 with  $120\Omega$  or B4/350-A102 with  $350\Omega$  from Gantner Instruments GmbH.

The bridge excitation voltage is switched via software between 1V, 2.5V, 5V and 10V.

**i IMPORTANT**

The plug must have the same resistance values as the strain gauges used, because otherwise no measurement is possible. Since, for reasons of stability, all necessary completion resistances are located in the , you have to select a full bridge circuit as the bridge type for the channel.

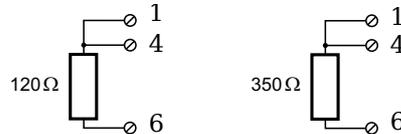


Abb. 4-20 A102, measurement with strain-gauge quarter bridge using Q.bloxx Terminal B4 on Plug 2.

**4.8.5****IEPE/ICP® sensor**

The sensor is supplied with 4mA of current from the module (current supply).

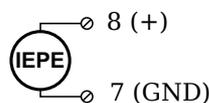


Abb. 4-21 A102, measurement with IEPE and ICP® sensors, Plug 2.

**4.8.6****Analog output**

An analog output for voltage or current is available on Plug 1. The selection between voltage and current is made via software.



Abb. 4-22 A102, output of voltage or current, Plug 1.

#### 4.8.7

### Digital input and output

Contacts for four inputs and two outputs are available on Plug 1.

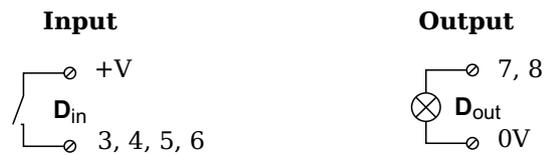


Abb. 4-23 A102, digital input and output, Plug 1.

The digital input is active (high level) when the applied signal voltage lies above the threshold of 10V.

## 4.9

**Q.brixx A104: Connecting sensors**

The Q.brixx Module A104 has eight electrically isolated analog inputs for thermocouples or voltages. The pin assignment of the two connector strips is identical and the connection terminals have numbers for identifying the connections. If several connections are possible, you will find the associated ones in each case at the same place in the circuit diagrams, for example each of the figures quoted in the second place belong to one possible connection method.

The module can also be obtained with other connections, e.g. with Mini TKC sockets. In this variant no Q.bloxx Terminal CJC-A104 is needed.

**i Tip**

To secure the thermocouple plug-in connector against falling out, perforated metal nipples are fitted over the sockets in the version with TKC sockets. After inserting all thermocouple plug-in connectors, insert, for example, a wire through the holes in the plugs and the metal nipples and twist the ends of the wire.

Measurement ground (-) and the (module) supply voltage are electrically isolated in the module.

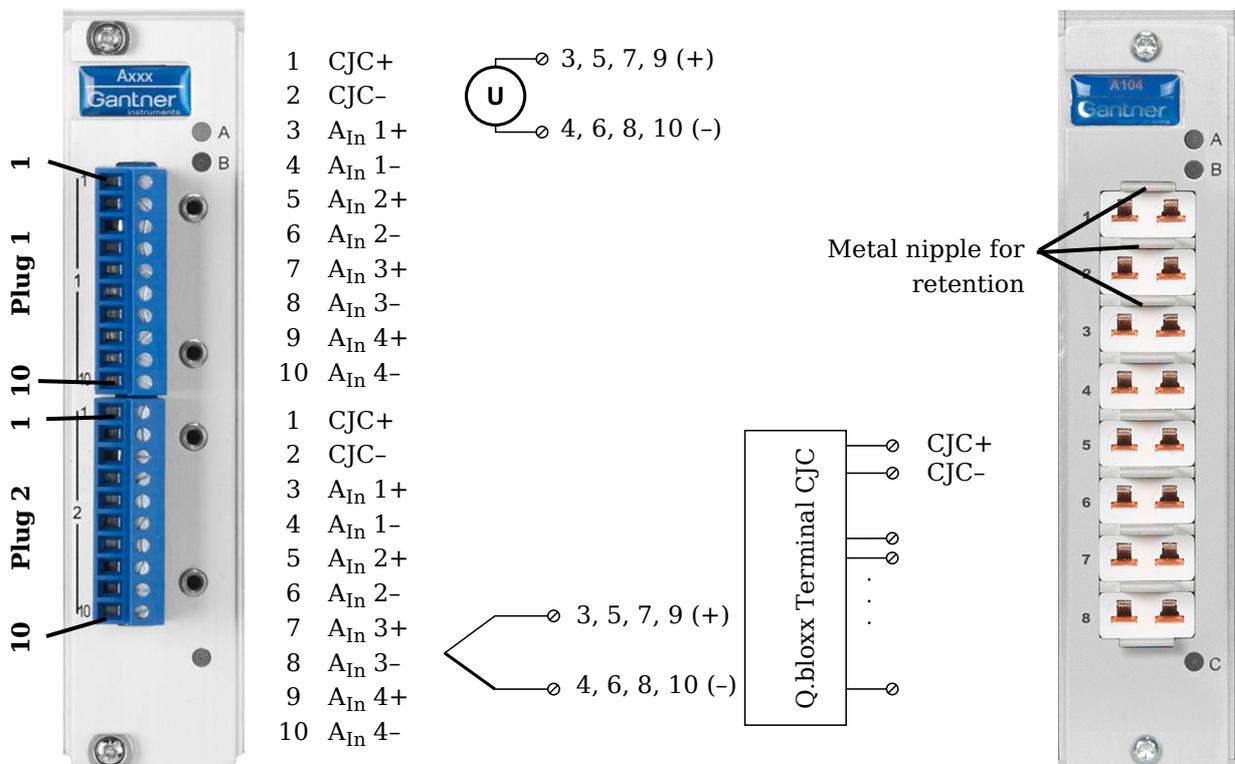


Abb. 4-24 Pin assignment for Q.brixx Module A104 (left), version with Mini TKC sockets on the right side.

---

**i Tip**

Further information on transducers and sensors can also be found in Chapter 7 ff. page 95.

---

## 4.9.1

**Voltage**

You can measure voltages of up to 80mV.

---

**i IMPORTANT**

Voltages which exceed the admissible limits produce incorrect measurement data, because the inputs are protected against overvoltages and limit the input voltage.

---

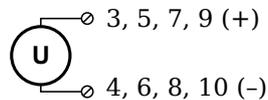


Abb. 4-25 A104, voltage measurement.

## 4.9.2

**Thermocouple**

For connecting thermocouples you need a special connecting plug which contains the comparative measuring point (cold junction compensation) required for thermocouples. The plug can be obtained under the designation Q.bloxx Terminal CJC-A104 from Gantner Instruments GmbH. You can connect the following types of thermocouple: B, E, J, K, L, N, R, S, T and U.

Alternatively, you can also use two thermocouples or a reference temperature source.

---

**i Tip**

You will find information on the comparative measuring point and on the measurement with a reference temperature source in Section 7.5, *Measuring with thermocouples*, page 104.

---

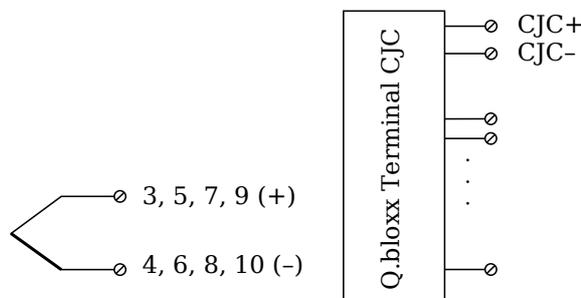


Abb. 4-26 A104, measurement with thermocouple using Q.bloxx Terminal CJC-A104.

## 4.10

## Q.brixx A106: Connecting sensors and I/O

The Q.brixx Module A106 has two electrically isolated analog inputs, two analog outputs and four digital inputs and outputs. The pin assignment of the two connector strips is identical and the connection terminals have numbers for identifying the connections.

GND identifies the analog and the measurement ground, 0V and +V refer to the (external) supply voltage connections. Measurement ground/GND and (module) supply voltage are electrically isolated in the module. The measurement ground for input and the analog ground (output) are identical.

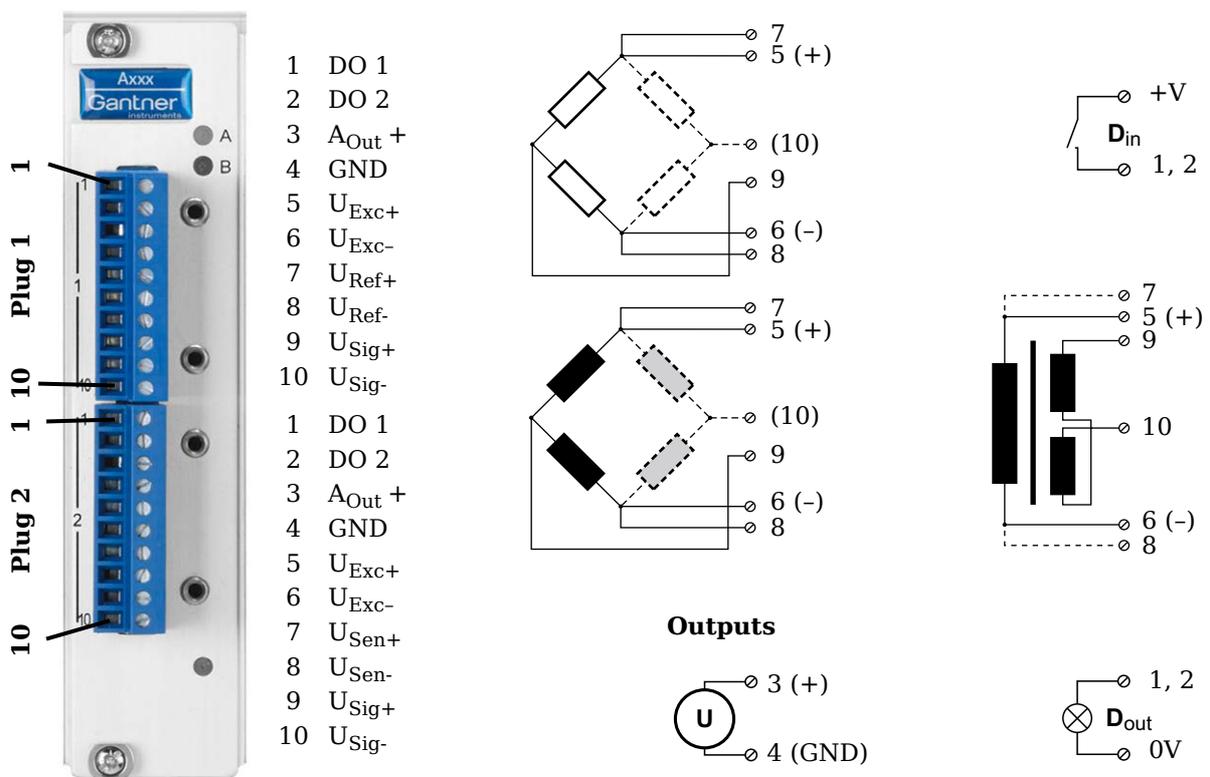


Abb. 4-27 Pin assignment for Q.brixx Module A106.

**i** Tip

Further information on transducers and sensors can also be found in Chapter 7 ff. page 95.

## 4.10.1

## Full and half-bridge transducers

With (resistive) full bridges (strain-gauge full bridges) all connections are occupied. If the sensor has no sensing leads, you specify this during the module configuration (**Type** column). With half

bridges the side drawn in broken lines and the connection 10 are omitted.

The bridge excitation voltage can be 2.5V or 5V (DC or CF).

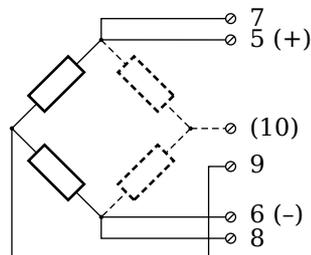


Abb. 4-28 A106, measurement with full and half bridges.

#### **i** Tip

Information about the types of circuit and the respective advantages and disadvantages can be found in Section 7.2, *Connecting sensors with sensing leads*, page 100.

### 4.10.2

#### Strain-gauge quarter bridge

For the connection of strain-gauge quarter bridges you need a special connecting plug which contains the completion resistances. The plug can be obtained under the designation Q.bloxx Terminal B4/120-A106 with 120Ω or B4/350-A106 with 350Ω from Gantner Instruments GmbH.

The bridge excitation voltage can be 2.5V or 5V (DC or CF).

#### **i** IMPORTANT

The plug must have the same resistance values as the strain gauges used, because otherwise no measurement is possible. Select a half-bridge circuit as the type of bridge for the channel.

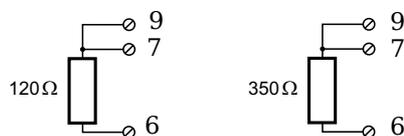


Abb. 4-29 A106, measurement with strain-gauge quarter bridge using Q.bloxx Terminal B4.

### 4.10.3

#### Inductive full and half bridges

With inductive full bridges all connections are occupied. If the sensor has no sensing leads, you specify this during the module configuration (**Type** column). With half bridges the side drawn in broken lines and the connection 10 are omitted.

The bridge excitation voltage can be 2.5V or 5V.

**i IMPORTANT**

During the configuration set **CF 4800Hz** (carrier frequency) in the **Type** column; inductive sensors cannot be operated with direct voltage (DC) or 600Hz carrier frequency.

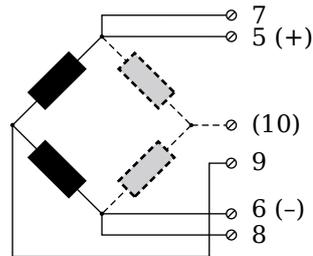


Abb. 4-30 A106, measurement with inductive full and half bridges.

#### 4.10.4

#### LVDT, RVDT

With (inductive) LVDTs or RVDTs all connections can be occupied, but you can also connect without sense leads and state this in the **Type** column when configuring the module.

The bridge excitation voltage can be 2.5V or 5V.

**i IMPORTANT**

During the configuration set **CF 4800Hz** (carrier frequency) in the **Type** column; inductive sensors cannot be operated with direct voltage (DC) or 600Hz carrier frequency.

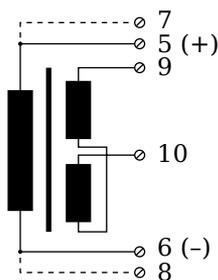


Abb. 4-31 A106, measurement with LVDTs and RVDTs.

#### 4.10.5

#### Analog output

An analog voltage output is available on each connecting plug.

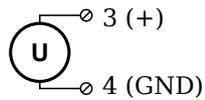


Abb. 4-32 A106, analog output.

#### 4.10.6

### Digital input and output

On each connecting plug two contacts are available for an input or output. You can use the appropriate function depending on the wiring.



Abb. 4-33 A106, Digital Input and Output.

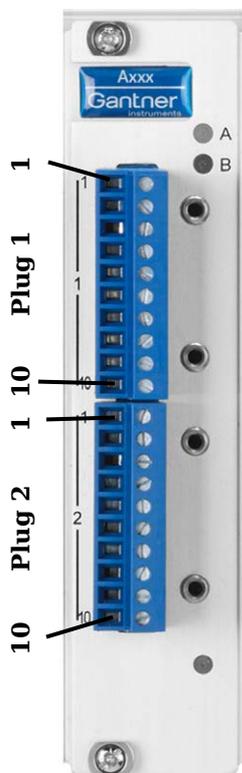
The digital input is active (high level) when the applied signal voltage lies above the threshold of 10V.

### 4.11

## Q.brixx A107: Connecting sensors

The Q.brixx Module A 107 has four electrically isolated analog inputs. The pin assignment of the two connector strips is identical and the connection terminals have numbers for identifying the connections. If several connections are possible, you will find the associated ones in each case at the same place in the circuit diagrams, for example each of the figures quoted in the second place belong to one possible connection method.

GND identifies the measurement ground. The four inputs (UF to GND) are electrically isolated in the module one to the other and to the (module) supply voltage.



- 1 UF
  - 2 A<sub>In</sub> 1
  - 3 A<sub>In</sub> 2
  - 4 A<sub>In</sub> 3
  - 5 GND
  - 6 UF
  - 7 A<sub>In</sub> 1
  - 8 A<sub>In</sub> 2
  - 9 A<sub>In</sub> 3
  - 10 GND
- 
- 1 UF
  - 2 A<sub>In</sub> 1
  - 3 A<sub>In</sub> 2
  - 4 A<sub>In</sub> 3
  - 5 GND
  - 6 UF
  - 7 A<sub>In</sub> 1
  - 8 A<sub>In</sub> 2
  - 9 A<sub>In</sub> 3
  - 10 GND

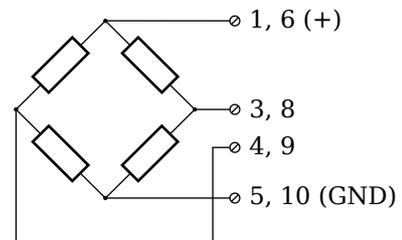
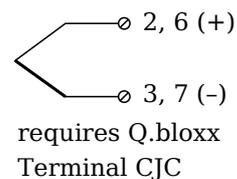
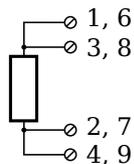
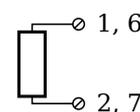
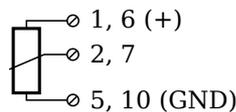
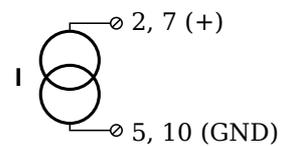
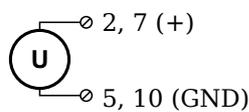
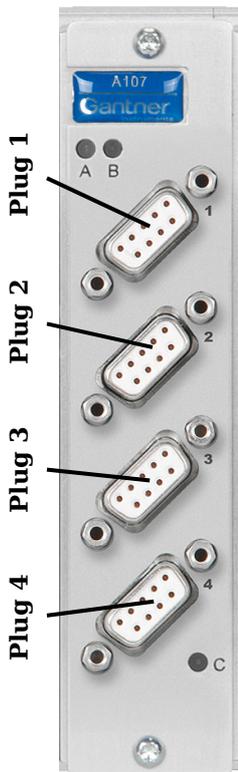


Abb. 4-34 Pin assignment for Q.brixx Module A107 (terminal version).

The module can also be obtained in a connection variant with four 9-pole D-sub sockets (A107 DB9, refer to Abb. 4-35). With this version the module power supply (+V and 0V) is available on the D-sub sockets. GND identifies the measurement ground. The four inputs are electrically isolated in the module one to the other and to the (module) supply voltage.



- 1 UF
- 2 A<sub>In</sub> 2
- 3 NC
- 4 0V
- 5 +V
- 6 NC
- 7 A<sub>In</sub> 3
- 8 GND
- 9 A<sub>In</sub> 1

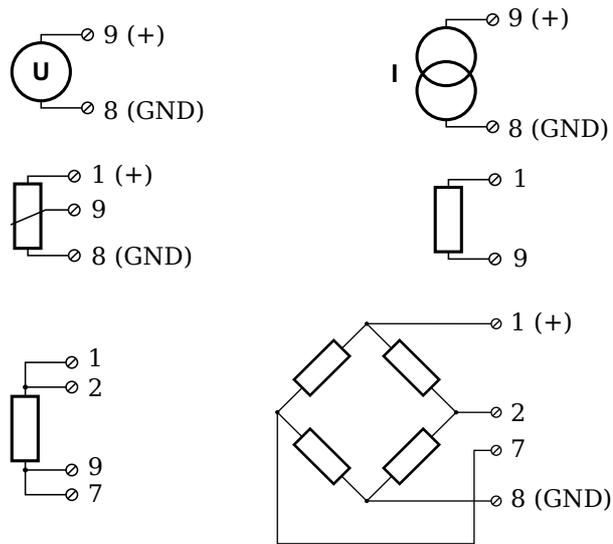


Abb. 4-35 Pin assignment for Q.brixx Module A107, version with D-sub sockets.

**i Tip**

Further information on transducers and sensors can also be found in Chapter 7 ff. page 95.

4.11.1

**Voltage**

You can measure voltages of up to 10V.

**i IMPORTANT**

Voltages which exceed the admissible limits produce incorrect measurement data, because the inputs are protected against overvoltages and limit the input voltage.



Abb. 4-36 A107, measurement of voltage: left: terminal version; right: D-sub sockets.

## 4.11.2

**Current**

A shunt resistance of  $50\Omega$  is integrated into the Q.brixx Module A107 for current measurement. This facilitates the measurement of currents of up to 25 mA. For higher currents use a voltage measurement and an external shunt; refer to Section 7.4, page 103.



Abb. 4-37 A107, measurement of current; left: terminal version; right: D-sub sockets.

## 4.11.3

**Potentiometer**

Potentiometers with resistances between 1 kOhm and 10 kOhm are connected in a three-wire configuration.

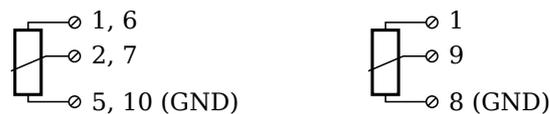


Abb. 4-38 A107, measurement with potentiometers; left: terminal version; right: D-sub sockets.

## 4.11.4

**Resistance, Pt100, Pt1000**

You can connect resistances and Pt100/1000 probes in two-wire or four-wire circuits. You specify the selected type of circuit during the module configuration (**Type** column).

**2-wire circuit****4-wire circuit**

Abb. 4-39 A107, measurement of resistance and Pt100/1000 probes; left: terminal version; right: D-sub sockets.

---

**i Tip**

Information about the types of circuit and the respective advantages and disadvantages can be found in Section 7.2, *Connecting sensors with sensing leads*, page 100.

---

## 4.11.5

**Thermocouple (only with terminal version)**

For connecting thermocouples you need a special connecting plug which contains the comparative measuring point (cold junction compensation) required for thermocouples. The plug can be obtained under the designation Q.bloxx Terminal CJC-A107 from Gantner Instruments GmbH. You can connect the following types of thermocouple: B, E, J, K, L, N, R, S, T and U.

Alternatively, you can also use two thermocouples or a reference temperature source.

---

**i Tip**

You will find information on the comparative measuring point and on the measurement with a reference temperature source in Section 7.5, *Measuring with thermocouples*, page 104.

---

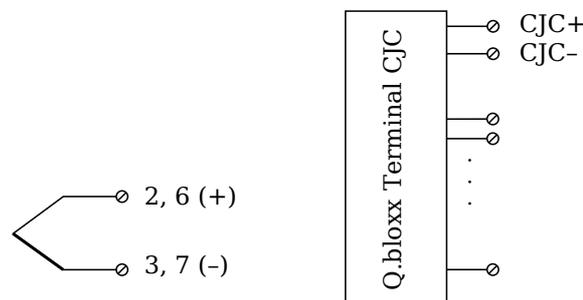


Abb. 4-40 A107, measurement with thermocouple using Q.bloxx Terminal CJC-A107.

## 4.11.6

**Full-bridge transducer**

With (resistive) full bridges (strain-gauge full bridges) four connections are occupied. If the sensor has sense leads, you should connect them to the relevant supply lines: in the terminal version to terminals 1 and 5 or 6 and 10, with D-sub sockets to pins 1 and 8.

The bridge excitation voltage is 2.5V.

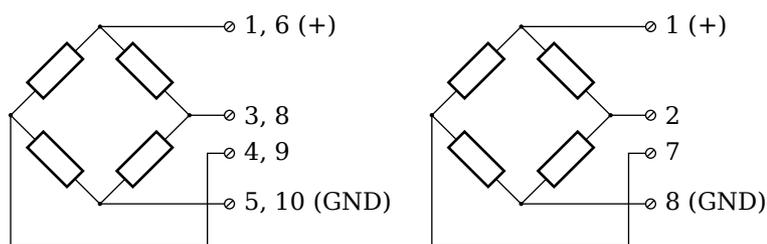


Abb. 4-41 A107, measurement with full bridge; left: terminal version; right: D-sub socket.

#### 4.11.7

### Strain-gauge half and quarter bridges

For the connection of strain-gauge half or quarter bridges you need a special connecting plug which contains the completion resistances. The plug for the terminal version can be obtained under the designation Q.bloxx Terminal B4/120-A107 with  $120\Omega$  or B4/350-A107 with  $350\Omega$  from Gantner Instruments GmbH. An adapter plug is available for the version with D-sub sockets (Abb. 4-42).



Abb. 4-42 Adapter plug for D-sub version.

The bridge excitation voltage is 2.5V.

#### **i** IMPORTANT

For strain-gauge quarter bridges the plug or the terminal must have the same resistance values as the strain gauges used, because otherwise no measurement is possible.

Since, for reasons of stability, all necessary completion resistances are located in the Q.bloxx terminal, you always have to select a full bridge circuit as the bridge type for the channel.

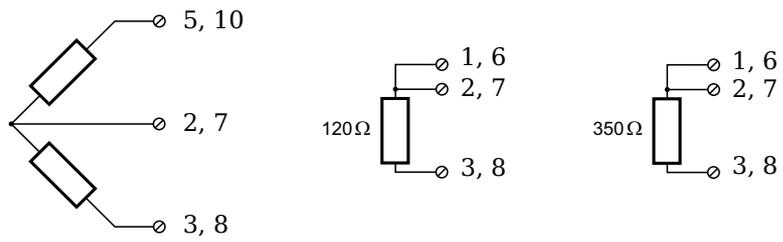


Abb. 4-43 A107, measurement with strain-gauge half bridge and quarter bridge using Q.bloxx Terminal B4 (terminal version).

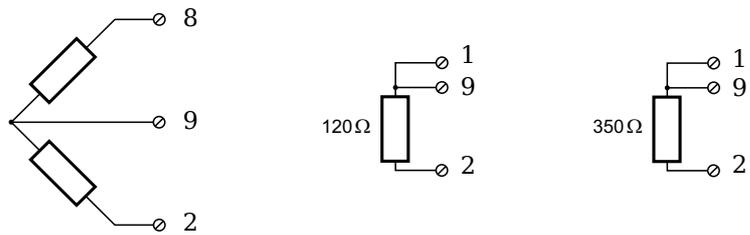


Abb. 4-44 A107, measurement with strain-gauge half bridge and quarter bridge through adapter plug on the version with D-sub sockets.

## 4.12

**Q.brixx A108: Connecting sensors and I/O**

The Q.brixx Module A108 has eight electrically isolated analog inputs and two digital inputs and outputs. The pin assignment of the two connector strips is identical and the connection terminals have numbers for identifying the connections. If several connections are possible, you will find the associated ones in each case at the same place in the circuit diagrams, for example each of the figures quoted in the second place belong to one possible connection method.

The module is also available in the connection variant with eight BNC sockets (A108 BNC).

The designations 0 V and +V refer to the (external) supply voltage connections. Measurement ground (-) and the (module) supply voltage are electrically isolated in the module.

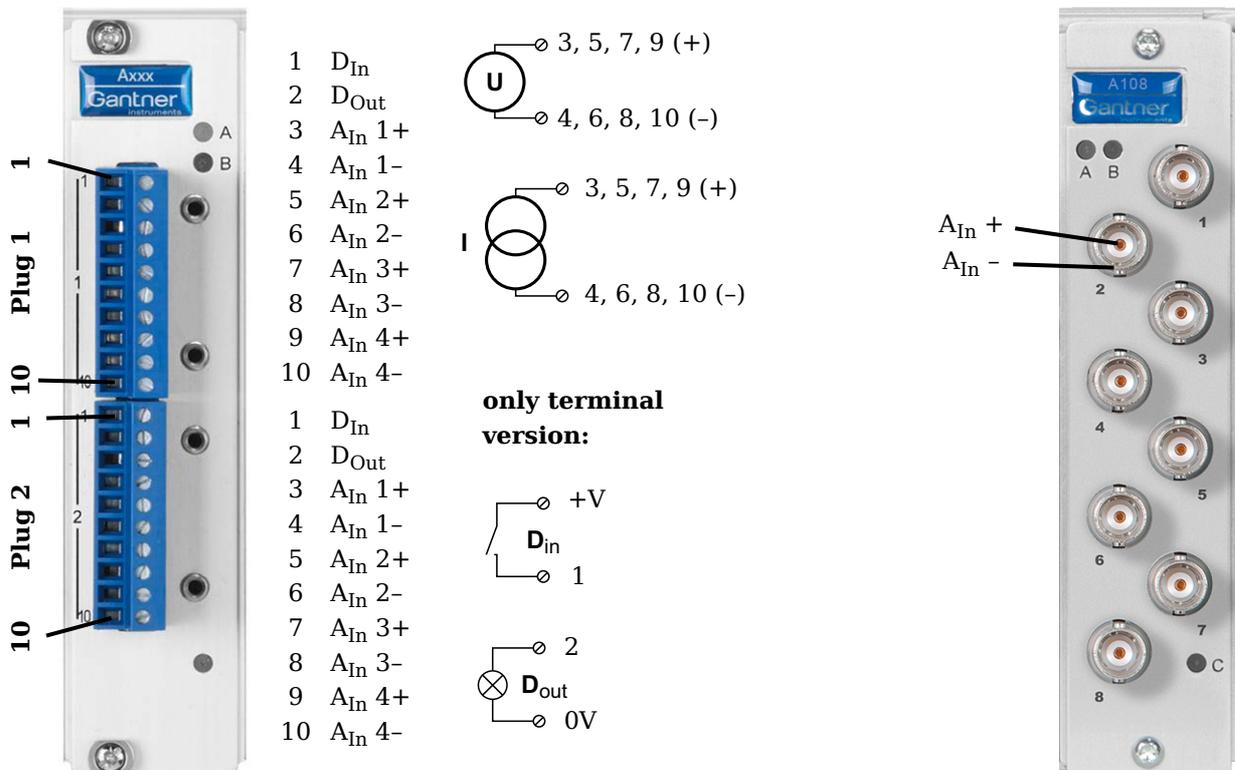


Abb. 4-45 Pin assignment for Q.brixx Module A108 (left), version with BNC sockets on the right side.

**i Tip**

Further information on transducers and sensors can also be found in Chapter 7 ff. page 95.

## 4.12.1

**Voltage**

You can measure voltages of up to 10V.

**i IMPORTANT**

Voltages which exceed the admissible limits produce incorrect measurement data, because the inputs are protected against overvoltages and limit the input voltage.

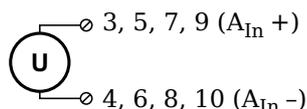


Abb. 4-46 A108, voltage measurement (terminal version); in the version with BNC sockets the (inner) pin contact has to be connected to +. The outer conductor is connected to -.

## 4.12.2

**Current**

For current measurement you need the Q.bloxx Terminal SR connecting plug containing the shunt resistances for the terminal version. This facilitates the measurement of currents of up to 25mA. In the version with BNC sockets you must use a suitable shunt resistance and determine the current from the voltage drop and the resistance value of the shunt. The connection is made as for the voltage measurement.

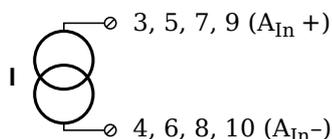


Abb. 4-47 A108, current measurement using the Q.bloxx Terminal SR.

## 4.12.3

**Digital input and output**

On each connecting plug of the terminal version two contacts are available in each case for one input and one output.

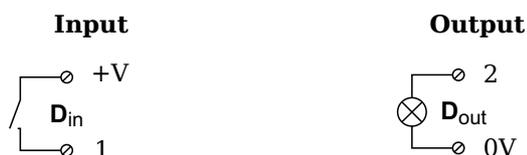


Abb. 4-48 A108, digital input and output.

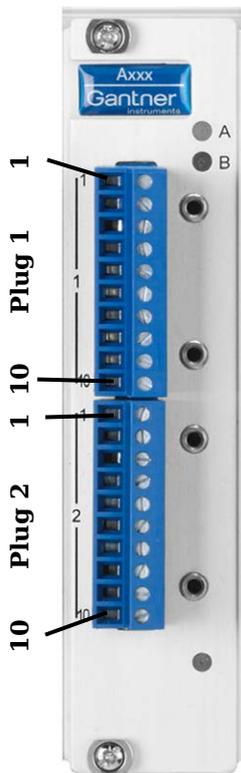
The digital input is active (high level) when the applied signal voltage lies above the threshold of 10V.

### 4.13

## Q.brixx A109: Connecting I/O and outputs

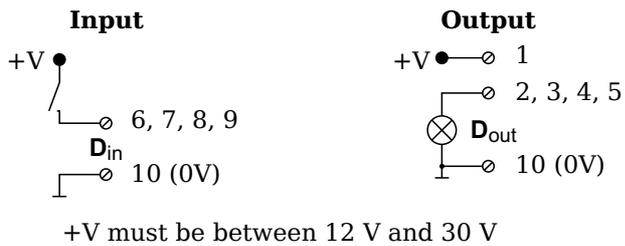
The Q.brixx Module A109 has four electrically isolated analog outputs, four digital inputs and four digital outputs. The assignment of both connector strips is *not* identical. The plug number is specified in the following. The connection terminals have numbers for identifying the connections. If several connections are possible, you will find the associated ones in each case at the same place in the circuit diagrams, for example each of the figures quoted in the second place belong to one possible connection method.

The designations 0 V and +V refer to the (external) supply voltage connections, NC indicates "not assigned". Analog ground (-) and the (external) supply voltage (0V) are electrically isolated in the module.



- 1 +V
  - 2 D<sub>Out</sub> 1
  - 3 D<sub>Out</sub> 2
  - 4 D<sub>Out</sub> 3
  - 5 D<sub>Out</sub> 4
  - 6 D<sub>In</sub> 1
  - 7 D<sub>In</sub> 2
  - 8 D<sub>In</sub> 3
  - 9 D<sub>In</sub> 4
  - 10 0V
- 
- 1 NC
  - 2 NC
  - 3 A<sub>Out</sub> 1+
  - 4 A<sub>Out</sub> 1-
  - 5 A<sub>Out</sub> 2+
  - 6 A<sub>Out</sub> 2-
  - 7 A<sub>Out</sub> 3+
  - 8 A<sub>Out</sub> 3-
  - 9 A<sub>Out</sub> 4+
  - 10 A<sub>Out</sub> 4-

#### Plug 1, digital inputs and outputs



#### Plug 2, analog outputs

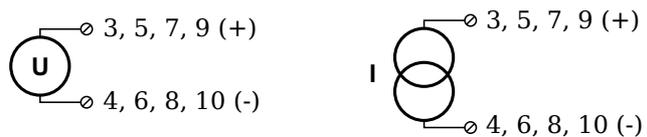


Abb. 4-49 Pin assignment for Q.brixx Module A109.

#### 4.13.1

### Digital input and output, Plug 1

On Plug 1 contacts for four inputs and four outputs are available. Since the inputs and outputs of this module are electrically isolated from the supply voltage, you must also connect 0V for the inputs and 0V and a supply voltage (+V) for the outputs.



Abb. 4-50 A109, digital input and output, Plug 1.

The digital input is active (high level) when the applied signal voltage lies above the (programmable) threshold.

Possible combinations of contact assignments for the inputs are shown in the following table; refer also to the block diagrams for Module D101.

6	7	8	9
status	status	status	status
status	status	2-channel signal <sup>1)</sup>	
2-channel signal <sup>1)</sup>		2-channel signal <sup>1)</sup>	
4-channel signal <sup>2)</sup>			

<sup>1)</sup> e.g. counter with additional input for counting direction or 2-phase counter signals or frequency measurement with direction detection (torque transducers)

<sup>2)</sup> e.g. counter with additional inputs for counting direction, zero reference and reset/enable for zero reference

### 4.13.2

#### Analog output, Plug 2

The analog outputs on Plug 2 supply voltage or current. Selection is made via software.



Abb. 4-51 A109, output of voltage or current, Plug 2

## 4.14

**Q.brixx A116: Connecting sensors**

The Q.brixx Module A116 has eight analog inputs.

The channels (measurement ground) are electrically isolated against the (module) supply voltage and the interface.

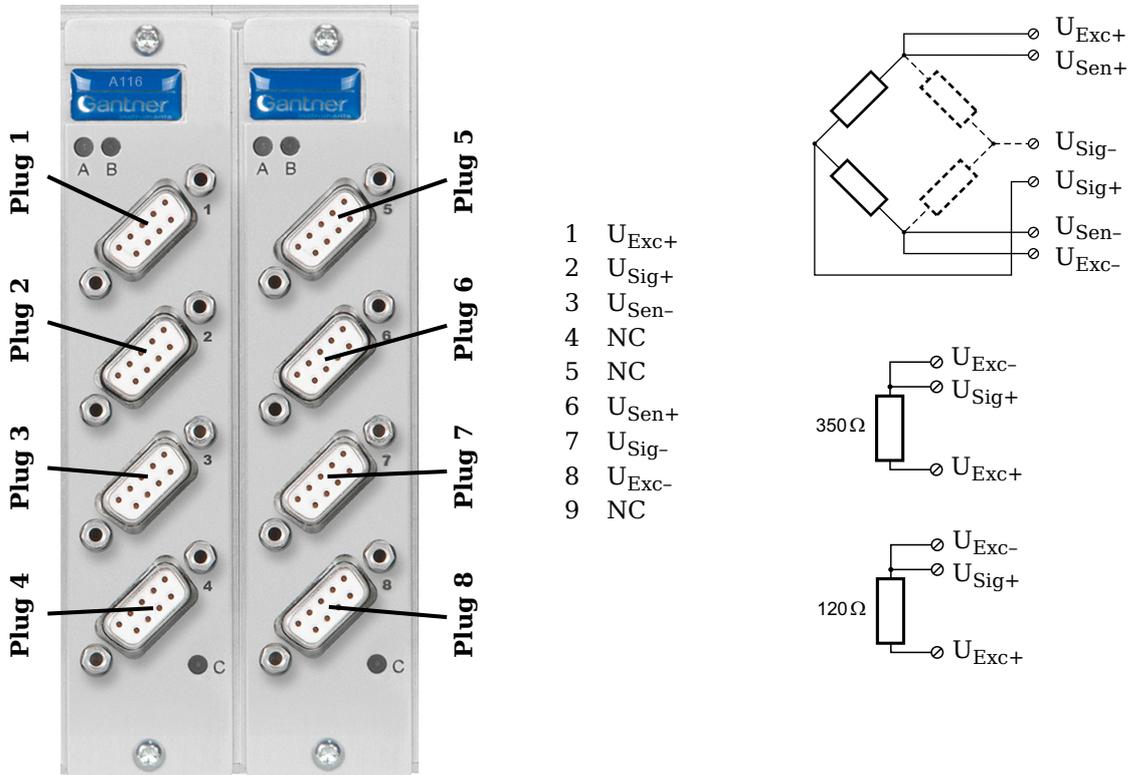


Abb. 4-52 Pin assignment for Q.brixx Module A116.

## 4.14.1

**Full and half-bridge transducers**

With (resistive) full bridges (strain-gauge full bridges) six connections are used per measuring point. If the sensor has no sensing leads, you specify this during the module configuration (**Type** column); the  $U_{Sen}$  inputs then remain open. With half bridges the side drawn in dashes and the  $U_{Sig-}$  connection are omitted.

The bridge excitation voltage is  $2V_{DC}$ ; with  $350\Omega$  sensor resistance you can also use  $4V_{DC}$ . The internal shunt resistance can be activated also with full and half bridges.

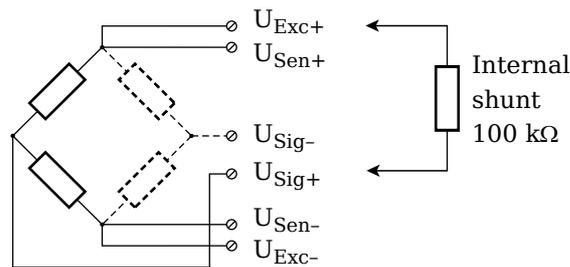


Abb. 4-53 A116, measurement with full and half bridges;  $U_{SIG}$  = signal voltage (output signal),  $U_{SEN}$  = sense lead,  $U_{EXC}$  = excitation voltage

For the activation of the shunt resistance refer to Section 4.14.3.

**i** Tip

Information about the types of circuit and the respective advantages and disadvantages can be found in Section 7.2, *Connecting sensors with sensing leads*, page 100.

#### 4.14.2

#### Strain-gauge quarter bridge

With this module, for the connection of strain-gauge quarter bridges you do not need any special connection plugs as the  $120\Omega$  and  $350\Omega$  completion resistances are present in the module and only need to be activated. In addition you can activate the internal shunt resistance for test purposes.

The bridge excitation voltage is  $2V_{DC}$ ; with  $350\Omega$  sensor resistance you can also use  $4V_{DC}$ .

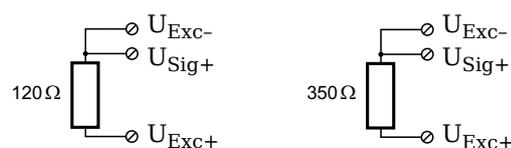


Abb. 4-54 A116, measurement with a strain-gauge quarter bridge, direct connection.

For the activation of the shunt resistance refer to Section 4.14.3.

With the three-wire circuit the internal completion resistance is used in this module to determine the voltage drop over the cable and to correct the result accordingly. In this way not only can the influence of the temperature on the cable (normal three-wire circuit) be compensated, but also the loss of sensitivity due to the cable resistance over a wide range.

## 4.14.3

## Activating the shunt resistance

You can activate the shunt both via a variable and manually via a button.

Open the module settings dialog (Fig. 4-55), activate the tab **Variable definition** and click in the column **Format/balance**. The dialog of Fig. 4-56 opens.

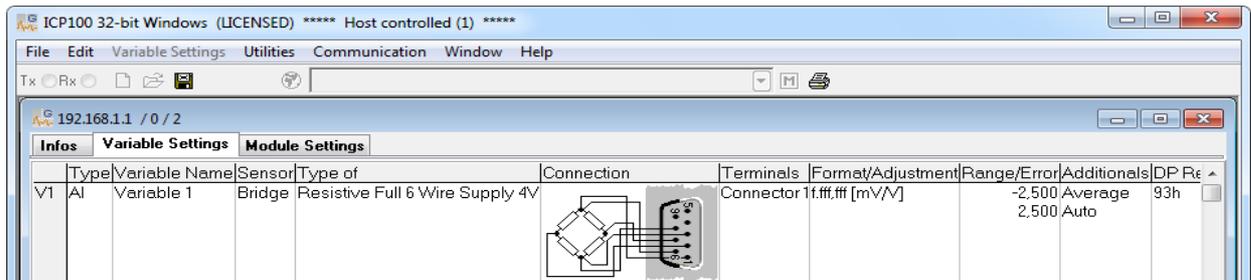


Abb. 4-55 Module configuration dialog.

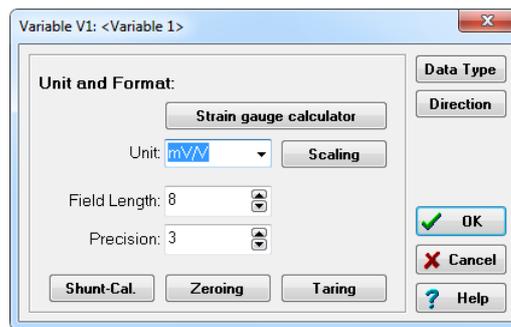


Abb. 4-56 Dialog for format settings.

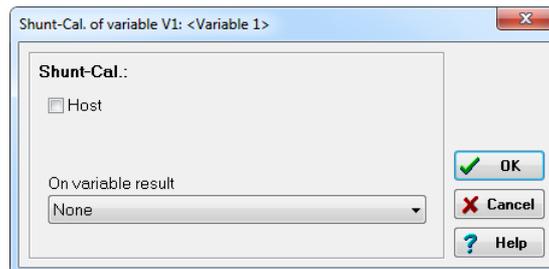


Abb. 4-57 Dialog for shunt activation.

## Manual activation

Define the **Direction** for the variable on **Input/output** (Fig. 4-56) and click on **Shunt cal.** Activate **Control computer** in the dialog (Fig. 4-57).

Setting a value of **16** for the variable (the channel) activates the shunt and **0** deactivates it again.

**Activation via variable**

Click on **Shunt cal.** Activate **At variable value** in the dialog (Fig. 4-57) and specify the variable to be used.

Any variable value > 0.5 activates the shunt.

## 4.15

## Q.brixx A123: Connecting sensors

**DANGER**

The cables to be connected or disconnected may carry voltages of up to 1200V!

Before connecting or disconnecting cables make sure that all sources of power are Locked Out.

The Q.brixx module A123 can be used in the categories CAT II up to 1000V and CAT III up to 600V and has four electrically isolated analog inputs.

With this module the connection is provided through four BNC sockets. The outer side of the BNC sockets is isolated and the electrical connection is made through the inner side of the socket.

Measurement ground (-) and the (module) supply voltage are electrically isolated in the module.

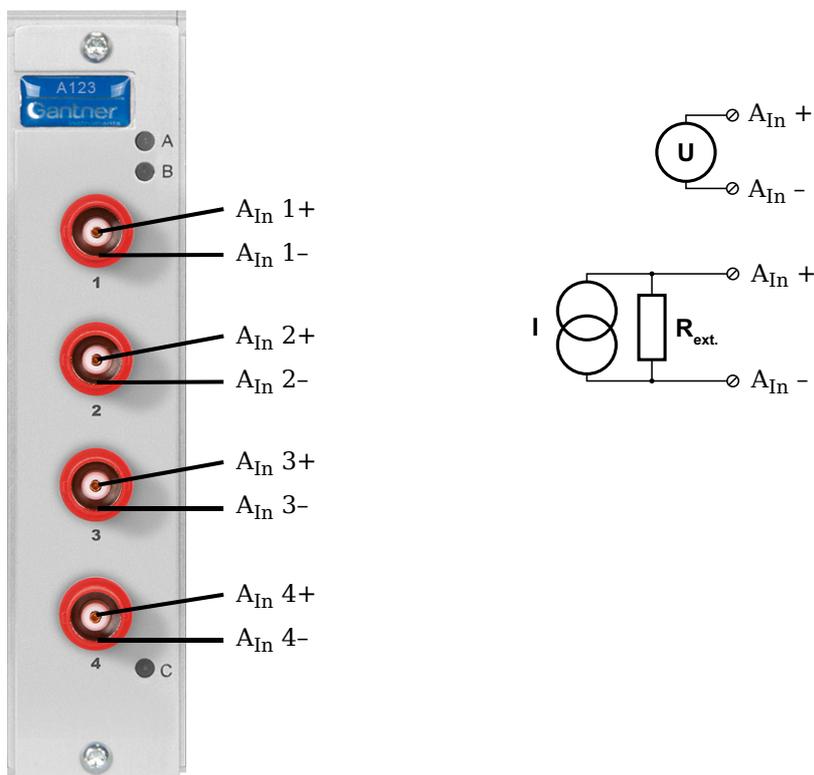


Abb. 4-58 Pin assignment for Q.brixx Module A123.

**i** Tip

Further information on transducers and sensors can also be found in Chapter 7 ff. page 95.

**4.15.1****Voltage**

You can measure voltage differences of up to  $\pm 10\text{V}$ . The voltage level (the potential) may be up to  $1200\text{V}_{\text{DC}}$ .

**i IMPORTANT**

Voltage differences which exceed the admissible limits produce incorrect measurement data, because the inputs are protected against overvoltages and limit the input voltage.

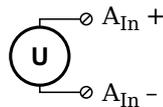


Abb. 4-59 A123, voltage measurement.

**4.15.2****Current**

You need an (external) shunt resistance for the current measurement.

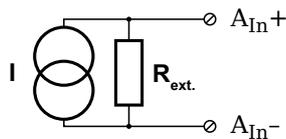


Abb. 4-60 A123, current measurement using an external shunt resistance.

## 4.16

## Q.brixx A124: Connecting sensors

**⚠ DANGER**

**The cables to be connected or disconnected may carry voltages of up to 1200V!**

**Before connecting or disconnecting cables make sure that all sources of power are Locked Out.**

The Q.brixx module A124 can be used in the categories CAT II up to 1000V and CAT III up to 600V and has four electrically isolated analog inputs for thermocouples. The terminal assignment is identical and the connection terminals have numbers for identifying the connections.

Measurement ground (-) and the (module) supply voltage are electrically isolated in the module. The plugs for the A124 module are 2-way plugs with push-in spring technology, i.e. you can insert a solid wire or a fine-stranded wire with a wire-end sleeve directly without screwing. The plugs are permanently joined to the housing and cannot be removed. With a screwdriver press on the white opener to be able to remove the connection -

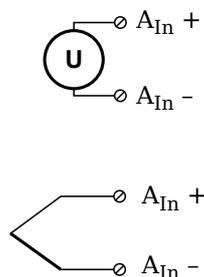
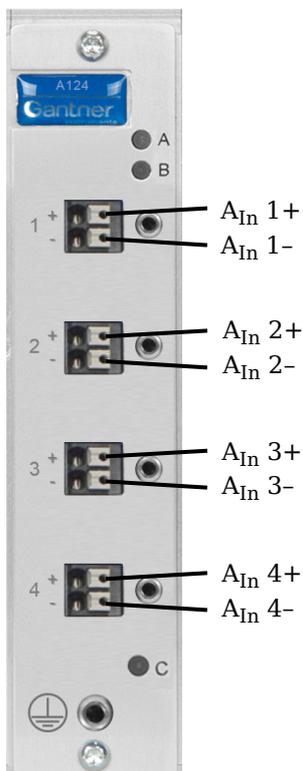


Abb. 4-61 Pin assignment for Q.brixx Module A124.

**i Tip**

Further information on transducers and sensors can also be found in Chapter 7 ff. page 95.

## 4.16.1

**Voltage**

You can measure voltage differences of up to  $\pm 80\text{mV}$ . The voltage level (the potential) may be up to  $1200V_{\text{DC}}$ .

**i IMPORTANT**

Voltage differences which exceed the admissible limits produce incorrect measurement data, because the inputs are protected against overvoltages and limit the input voltage.

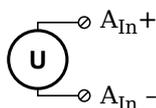


Abb. 4-62 A124, voltage measurement.

## 4.16.2

**Thermocouple**

Thermocouples can be connected directly; the comparative measuring point (cold junction compensation) is integrated in the module plug. You can connect the following types of thermocouple: B, E, J, K, L, N, R, S, T and U.

Alternatively, you can also use two thermocouples or a reference temperature source.

**i Tip**

You will find information on the comparative measuring point and on the measurement with a reference temperature source in Section 7.5, *Measuring with thermocouples*, page 104.

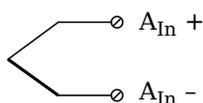


Abb. 4-63 A124, measurement with a thermocouple.

## 4.17

## Q.brixx A127: Connecting sensors

**⚠ DANGER**

**The cables to be connected or disconnected may carry voltages of up to 1200V!**

**Before connecting or disconnecting cables make sure that all sources of power are Locked Out.**

The Q.brixx module A127 can be used in the categories CAT II up to 1000V and CAT III up to 600V and has four electrically isolated analog inputs.

With this module the connection is provided through four BNC sockets. The outer side of the BNC sockets is isolated and the electrical connection is made through the inner side of the socket.

Measurement ground (-) and the (module) supply voltage are electrically isolated in the module.

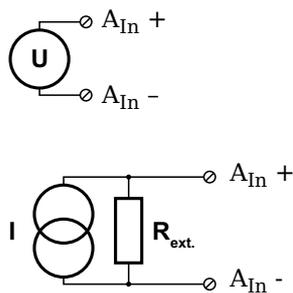
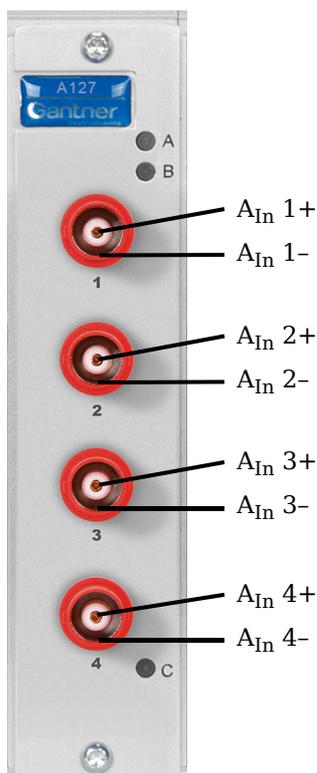


Abb. 4-64 Pin assignment for Q.brixx Module A127.

**i Tip**

Further information on transducers and sensors can also be found in Chapter 7 ff. page 95.

## 4.17.1

**Voltage**

You can measure voltage differences of up to  $\pm 1200\text{V}$ . Here, various input voltage ranges from  $\pm 40\text{V}_{\text{DC}}$  to  $\pm 1200\text{V}_{\text{DC}}$  are possible. The voltage level (the potential) may be up to  $1200\text{V}_{\text{DC}}$ .

**NOTICE**

Voltages above  $1200\text{V}$  can damage the module.

Each module is tested with a test voltage of  $5\text{kV}_{\text{DC}}$  for one minute. A longer duration or a higher voltage can damage the module. In addition, each period of overvoltage reduces the service life of the module.

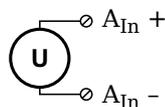


Abb. 4-65 A127, measurement of voltage.

**i IMPORTANT**

Voltages which exceed the admissible limits give incorrect measurement data, because the input voltage is internally limited.

## 4.17.2

**Current****NOTICE**

Confusing the current and voltage inputs can damage the module and/or the external load resistance.

Make sure that no high voltages are applied to the current inputs. The voltage drop must not be beyond  $\pm 2.4\text{V}$ .

You need an (external) shunt resistance for the current measurement.

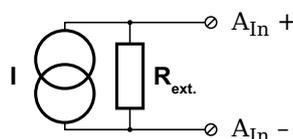


Abb. 4-66 A127, current measurement using an external shunt resistance.

## 4.18

## Q.brixx A128: Connecting sensors

**DANGER**

The cables to be connected or disconnected may carry voltages of up to 1200V!

Before connecting or disconnecting cables make sure that all sources of power are **Locked Out**.

The Q.brixx module A128 can be used in the categories CAT II up to 1000V and CAT III up to 600V and has four electrically isolated analog inputs.

With this module the connection is provided through four BNC sockets. The outer side of the BNC sockets is isolated and the electrical connection is made through the inner side of the socket.

Measurement ground (-) and the (module) supply voltage are electrically isolated in the module.

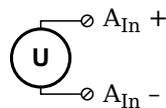
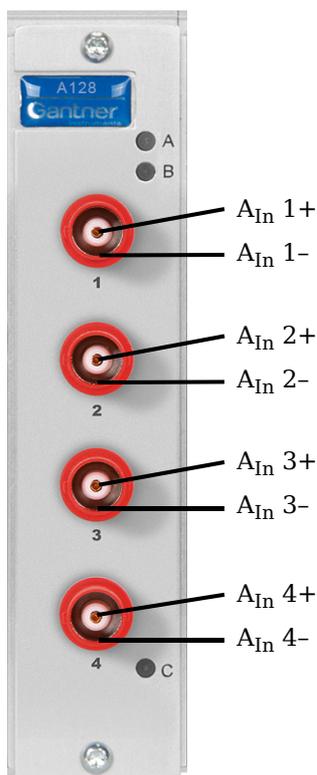


Abb. 4-67 Pin assignment for Q.brixx Module A128.

**i** Tip

Further information on transducers and sensors can also be found in Chapter 7 ff. page 95.

## 4.18.1

**Voltage**

You can measure voltages of up to  $\pm 1200V_{DC}$ . Here, various input voltage ranges from  $\pm 40V_{DC}$  to  $\pm 1200V_{DC}$  are possible.

**NOTICE**

Voltages above 1200V can damage the module.

Each module is tested with a test voltage of  $5kV_{DC}$  for one minute. A longer duration or a higher voltage can damage the module. In addition, each period of overvoltage reduces the service life of the module.

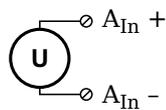


Abb. 4-68 A124, voltage measurement.

**i IMPORTANT**

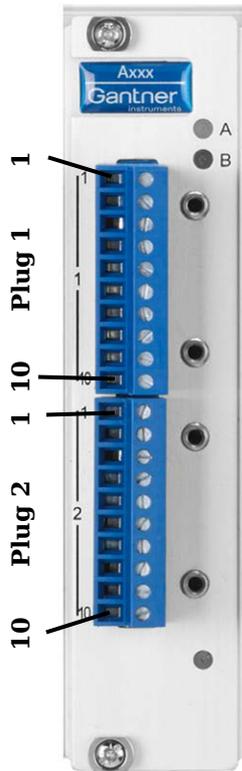
Voltages which exceed the admissible limits give incorrect measurement data, because the input voltage is internally limited.

## 4.19

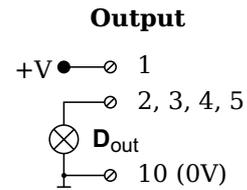
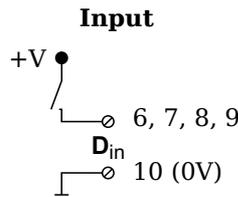
### Q.brixx D101: Connecting I/O

The Q.brixx Module D101 has eight digital inputs and eight digital outputs. The pin assignment of the two connector strips is identical and the connection terminals have numbers for identifying the connections.

The designations 0 V and +V refer to the (external) supply voltage connections.



- |    |                    |
|----|--------------------|
| 1  | +V                 |
| 2  | D <sub>Out</sub> 1 |
| 3  | D <sub>Out</sub> 2 |
| 4  | D <sub>Out</sub> 3 |
| 5  | D <sub>Out</sub> 4 |
| 6  | D <sub>In</sub> 1  |
| 7  | D <sub>In</sub> 2  |
| 8  | D <sub>In</sub> 3  |
| 9  | D <sub>In</sub> 4  |
| 10 | 0V                 |
- 
- |    |                    |
|----|--------------------|
| 1  | +V                 |
| 2  | D <sub>Out</sub> 1 |
| 3  | D <sub>Out</sub> 2 |
| 4  | D <sub>Out</sub> 3 |
| 5  | D <sub>Out</sub> 4 |
| 6  | D <sub>In</sub> 1  |
| 7  | D <sub>In</sub> 2  |
| 8  | D <sub>In</sub> 3  |
| 9  | D <sub>In</sub> 4  |
| 10 | 0V                 |



+V must be between 12 V and 30 V

Abb. 4-69 Pin assignment for Q.brixx Module D101.

### 4.19.1

#### Digital input and output

On each connecting plug contacts for four inputs and four outputs are available. Since the inputs and outputs of this module are electrically isolated from the supply voltage, you must also connect 0V for the inputs and 0V and a supply voltage (+V) for the outputs.

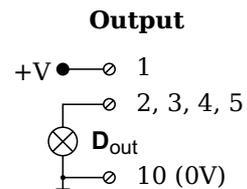
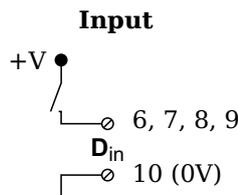


Abb. 4-70 D101, digital input and output.

The digital input is active (high level) when the applied signal voltage lies above the (programmable) threshold.

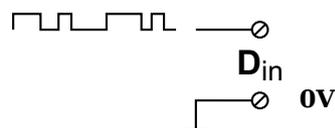
The following table shows possible combinations of contact assignments for the inputs:

Plug.Contact							
1.6	1.7	1.8	1.9	2.6	2.7	2.8	2.9
Status	Status	Status	Status	Status	Status	Status	Status
Status	Status	Status	Status	Status	Status	2-channel signal <sup>1)</sup>	
Status	Status	Status	Status	2-channel signal <sup>1)</sup>		2-channel signal <sup>1)</sup>	
Status	Status	Status	Status	4-channel signal <sup>2)</sup>			
Status	Status	2-channel signal <sup>1)</sup>		2-channel signal <sup>1)</sup>		2-channel signal <sup>1)</sup>	
Status	Status	2-channel signal <sup>1)</sup>		4-channel signal <sup>2)</sup>			
2-channel signal <sup>1)</sup>		2-channel signal <sup>1)</sup>		4-channel signal <sup>2)</sup>			
2-channel signal <sup>1)</sup>		2-channel signal <sup>1)</sup>		2-channel signal <sup>1)</sup>		2-channel signal <sup>1)</sup>	
4-channel signal <sup>2)</sup>				4-channel signal <sup>2)</sup>			
8-channel signal <sup>3)</sup>							

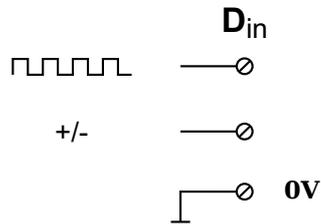
- 1) e.g. counter with additional input for counting direction or 2-phase counter signals or frequency measurement with direction detection (torque transducers)
- 2) e.g. counter with additional inputs for counting direction, zero reference and reset/enable for zero reference
- 3) e.g. sensors with binary coding

The following block diagrams give you an overview of the possible circuits.

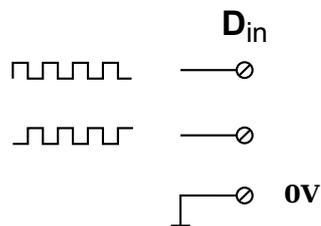
#### Measurement of status, time, frequency or PWM (Pulse-Width Modulation), 1 signal



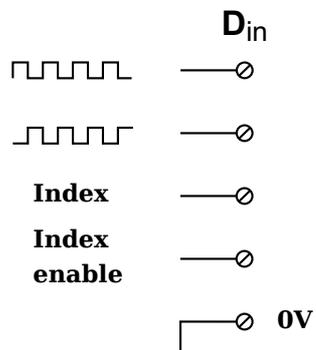
**Up/down counter or measurement of frequency and direction with static direction signal, 2 signals**



**Measurement of frequency and direction or up/down counter with 2-channel frequency signal (90° phase delay)**



**Measurement of frequency and direction or up/down counter with 4-channel frequency signal**



## 4.20

## Q.brixx S104: Supply Module

The Q.brixx Module S104 is used for supplying active sensors or other peripherals and provides four electrically isolated supply voltages on two connector strips:  $5V_{DC}$ ,  $12V_{DC}$ ,  $15V_{DC}$  and  $24V_{DC}$ . The output power is 5W per voltage. The assignment of the two connector strips is identical and the contacts of the first connection terminal are connected to the same type of contacts on the second connection terminal. The connection terminals have numbers for identifying the connections.

GND identifies the ground connection (0V) of a supply voltage and the corresponding supply voltage is stated after it in brackets. NC signifies "No Connection".

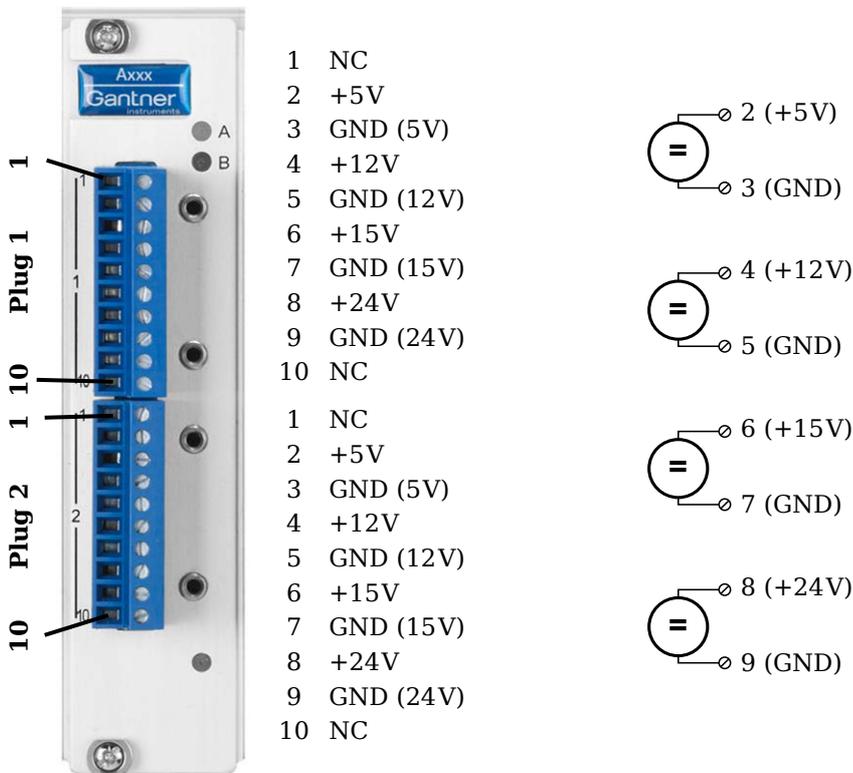


Abb. 4-71 Pin assignment for Q.brixx Module S104.

## 4.21

## Replacing a module

Since the configuration of a module is also saved in the base of the module which is permanently connected to the rear panel of the Q.brixx system, you can easily replace one module by another one of the same type, e.g. if you want to use a module with different connections (D-sub or thermocouple sockets).

Since the module configuration is also stored in the module base, it is sufficient to just replace the module. The configuration present in the base is automatically transferred into the module when the power supply is switched on.

### Procedure for replacement

1. Switch off the power supply to the Q.brixx system.
2. Release the screws of the module at the front of the Q.brixx system (refer to red marking in Fig. 4-72) with a cross-tip screwdriver.
3. Withdraw the module towards the front.
4. Push in the new module from the front (note the guiding grooves).
5. Retighten the module screws.
6. Switch on the power supply to the Q.brixx system.

The module will now be configured from the base (flashing LEDs). When LEDs cease to flash, the configuration is concluded and the module is ready for operation.

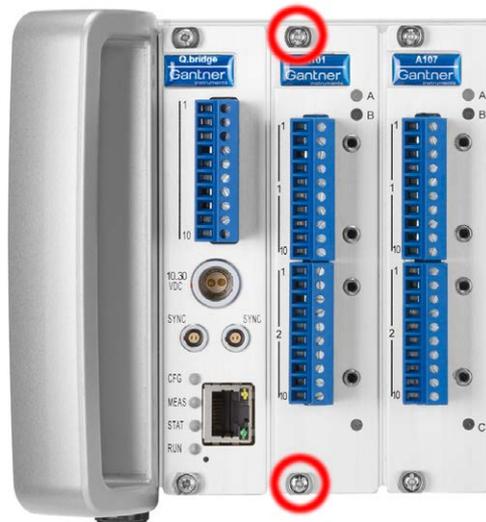


Abb. 4-72 To remove a module release the screws in the red circles.

## 4.22

### Replacing/changing the module type

If you are using a different type of module, the configuration is not loaded from the module base, because a different module type is involved.

The procedure is initially described in Section 4.22. Accordingly, you have to transfer the current or a new configuration into the base.

#### Transferring the configuration to the base

On saving a configuration, e.g. with the ICP 100 program or the test.commander program, the (new) configuration is automatically transferred into the base. In this way it is ensured that the same configurations are always present both in the base and in the module.

## 4.23

### Adding modules to or removing them from the system

A change in the number of modules can only be made by Gantner; for this please contact the support; refer to Chapter 7, *Functional Procedures*, page 95.

## 5

# Configuration

You can only configure the modules with the ICP 100 graphically guided configuration software (from version 3.2.21).

## 5.1

## Configuration via ICP 100

For the program a license number is needed which you have to enter to be able to save configurations. If you have installed the Gantner test.commander software, the ICP 100 software is also installed and is released when test.commander is licensed. You will find the license numbers in the PDF file enclosed with the supplied items and on the separate printout with your license data.

### Basic procedure

- Start the program.
- Define the communication parameters and establish the connection (communication) between the PC and Q.bridge; refer to Section 5.1.2, page 70.
- Enter the sensors used and their sensitivities to obtain an indication in the measured physical quantity.
- Define computations, digital inputs/outputs, alarm monitoring, etc.
- Activate all settings in the modules.

### Tip

At many points in the programs you can call the setting dialogs or settings via the context menu of an entry. You call the context menu with the right mouse key.

If you already have a configuration file with the required settings available, you can load this file into the relevant module with the program ICP 100.

## 5.1.1

### Installing the ICP 100

- ➔ We recommend that you close all open programs before the installation.

Insert the Gantner CD into your CD drive. In the standard configuration Windows opens the CD automatically and a start window appears. If you have deactivated the Windows autostart function, find the file StartUp.exe in the main directory on the CD and give the corresponding symbol a double click to obtain the start win-

dow. Alternatively, you can also start the program Setup.exe in the folder ICP100 to carry out the installation directly.

You will also find the relevant latest versions of the programs on our home page [www.gantner-instruments.com](http://www.gantner-instruments.com) via **Software > Download**.

## Procedure

- Click on the symbol over **Load software**.
- Click on the symbol  next to the program which you want to install.  
The program Setup.exe is started.
- Allow the file to open so that the installation can start.  
The starting dialog of the setup program appears.
- Follow the instructions of the setup program to define the installation directory and the program group for the software.  
Setup.exe creates the directory you have specified, if necessary and then copies all files to it.

When the program is started for the first time, you specify the language for the program user interface (you can change your selection at any time via **Utilities > Settings > Language**).

Then enter your license data via **Help > Info and Licensing**. If you have licensed the program test.commander, then the program ICP 100 is also enabled and a further license is not required.

### 5.1.2

#### Setting communication parameters, establishing connection

To be able to connect to the Q.bridge it must be in the *Transparent* mode. You can check this with the LEDs on the Q.bridge: RUN is on, MEAS is off and CFG flashes at approx. 1 Hz. Refer also to Section 4.3, *Status and flashing sequences of the Q.bridge LEDs*, page 16. If necessary, switch the Q.bridge off and then on again (withdraw power supply plug and insert it again).

Once you have connected the PC to the Q.bridge via Ethernet and have started the ICP 100 program, you have to specify in the program the interface to be used.

1. Select **Communication > Parameters**.
2. Specify the interface for the connection: **TCP/IP Base** (Fig. 5-1).
3. Enter the IP address (refer to Section 4.4.1, *Setting the Ethernet address (IP address) of the Q.bridge*, page 18) and use **8010** for the **Port**. Enter **6** seconds or more for the **Add.(itional) Timeout**. Do not activate **“Use scan for SNR”**,

because, as delivered, all modules have a unique address (Fig. 5-1).

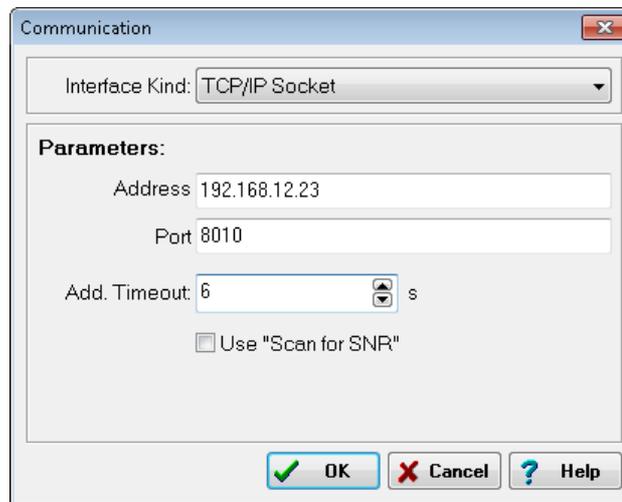


Abb. 5-1 Specifying the interface.

4. Start with **File > Bus scan** or click on  the interrogation of the modules connected to the bus coupler. The modules found are displayed (Fig. 5-2). If not all modules are displayed, check whether the module RUN-LED is lit. If not, either the module is not correctly connected to the previous module or it is defective.

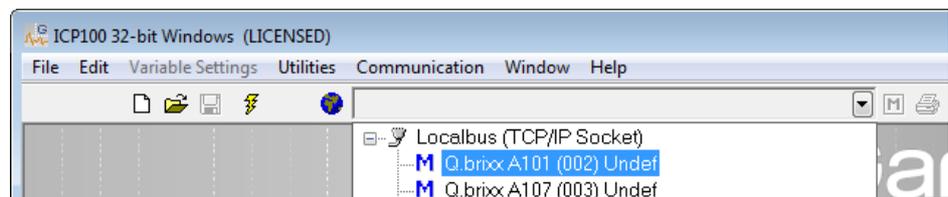


Abb. 5-2 Listing the modules found.

The baud rate of all modules must be set to 12 MBd and must not be changed; refer also to Section 4.4.4, *Setting the baud rate of the modules*, page 21.

For configuration select from the list of modules the one you want. Then carry out all the module settings in the window that is then displayed.

You can also call several windows for several modules. The **Windows** menu includes submenus to assign the individual windows.

### 5.1.3

#### Setting sensor parameters

In order to set parameters you should be connected to the module and have called the configuration program ( which is started

automatically by ICP 100): For configuration select the module you want from the list of modules. Then carry out all the module settings in the window that is then displayed.

All module signals are defined as variables. Therefore, for the entry activate the tab **Variable definition**.

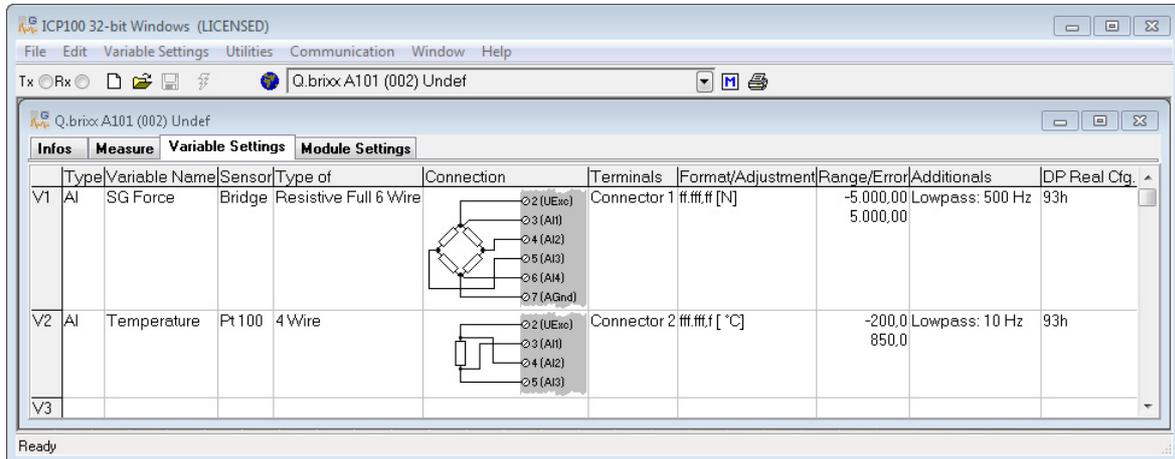


Abb. 5-3 Dialog with the configuration for force transducers (6-wire) and voltage input.

## Procedure

1. Click in the column **Type** of the first row (V1 = Variable 1) or mark the row (click on V1) and use **Variable definition > Type**.
2. Select **Analog. Input**.
3. Click in the column **Variable name** and allocate a name identifying the signal from the connected sensor.
4. Click in the column **Sensor** and specify the type of sensor. Depending on the type of module, you have various options available, e.g. **Bridge** for strain-gauge full and half-bridges, **Pt100**, **Resistance** for resistors or **Voltage** for voltage measurements and IEPE sensors.
5. Click in the column **Type of** and specify the type of circuit or further information about the sensor type. Depending on the selected sensor type, you have various options available, e.g. **2-wire** or **4-wire** (circuit) for resistive transducers or **Full 4-wire** or **Full 6-wire** (circuit) for strain-gauge full bridges. The column **Wiring diagram** shows you the pin assignment to be used. With more than one input the first inputs are also always occupied first (and first Plug 1, then Plug 2, etc.). Check that your sensor is connected correctly.
6. Click in the column **Format/balance** to enter the scaling for the sensor.

Depending on the type of sensor selected, you have various options available (refer also to Section 7.3, *Sensor scaling*, page 101):

- For voltage signals specify the conversion of the measured voltage to the physical quantity measured by the sensor or output the measured voltage quantity without conversion (scaling).
- For thermocouples or Pt100 sensors no further scaling is required as the conversion into °C is made automatically. The scaling is only needed when you want to convert to °F or K. In this case enter the **Unit** (type into the field) and then click on **Scaling**. Using the method **Factor and offset**. For a display in °F enter the factor **1.8** and **32** as the offset. For a display in °K enter the factor **1** and **-273.15** as the offset.
- For full and half-bridge transducers you can obtain the data from the data sheet or (better) from the transducer calibration certificate. For a force transducer with, for example, 2.03mV/V at 5kN enter the **Unit** (type **kN** in the field) and then click on **Scaling**. Using the method **2-point calibration**. Enter in each case **0** for **Point 1** for **Measurement** and **Displayed value** and **2.03** as **Measurement** and **5** as **Displayed measurement** for **Point 2**.  
Alternatively, you can also enter **N** as **Unit** and then **5000** as **Displayed value** for **Point 2**.
- For strain gauges you have the **Strain gauge calculator** available. Here, the unit is automatically changed to µm/m. In the dialog enter the gauge factor of your strain gauge (left field) and the bridge factor (right field) for your circuit.

Floating point numbers are always transferred as 4-byte values and further setting is not necessary here.

For the formats **Integer** (2 bytes) and **Long integer** (4 bytes) specify the number of **Decimal** places and the total number of places to be output (**Field length**). The field length is calculated including the points, but without any commas displayed for the thousands positions and it is only used for representation in one of the Gantner programs. Specifying three decimal places displays, for example, the value 1234 as 1,234. After closure of the dialog the number of transferred places and the unit are displayed in the column **Format/balance**, e.g. **ff,fff.f [kN]** for an output of a total of eight characters with two decimal places in the unit of kN and the decimal point.

If negative numbers occur, the display in this example is limited to -9,999.99 (eight characters without the comma).

7. Click in the column **Range/error** to limit the admissible value range and to define the reaction in the case of an error (optional).
8. Also optionally, you can specify filtering of the sensor signal in the column **Other**.
9. Save the settings with **File > Send to module** or click on . You can also save the settings in a file on the PC using **File > Save to file** so that you can load this configuration in the module again later.

### 5.1.4

### Zero balancing/taring the sensor

You have two ways of setting a measurement offset to zero, e.g. due to preloads:

1. Zero balance

With this method measurement takes place over a certain time period and the mean is computed. This mean value is then subtracted from all the following measurements.

2. Taring

With this method the (single) measurement present at a certain point in time is subtracted from all the following measurements.

#### Procedure

1. Click in the column **Type** of the first free row (V3 = Variable 3 in Fig. 5-4) or mark the row (click on V3) and use **Variable definition > Type**.
2. Select **Default**.
3. Click in the column **Variable name** and allocate a name specifying the purpose of the signal, e.g. Zero\_tare (Fig. 5-4).

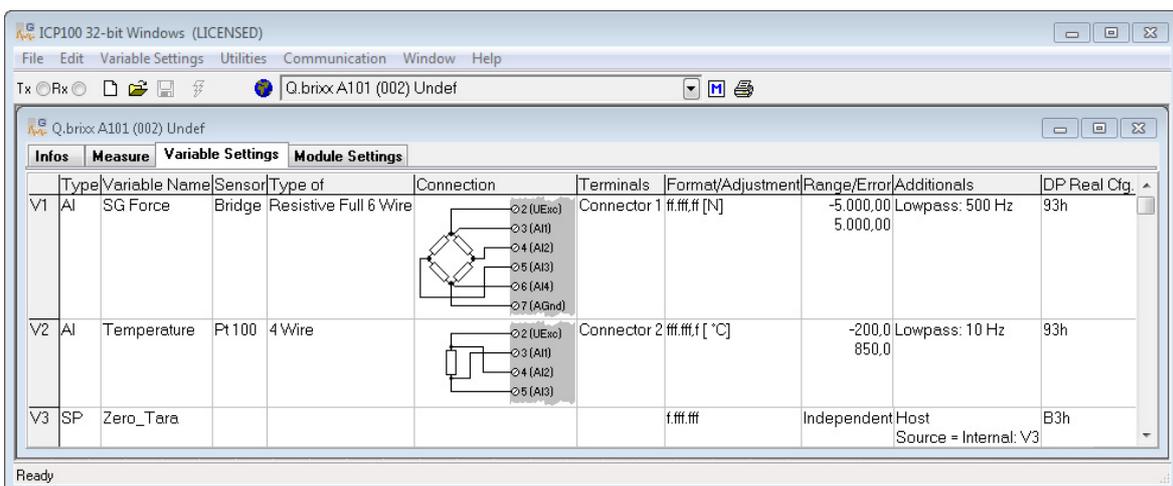


Abb. 5-4 Defining the variable for zero balancing and/or taring.

- Click in the column **Format/balance** of the channel for which zero balancing and/or taring is to be executed, e.g. for the strain-gauge force sensor in Fig. 5-4.

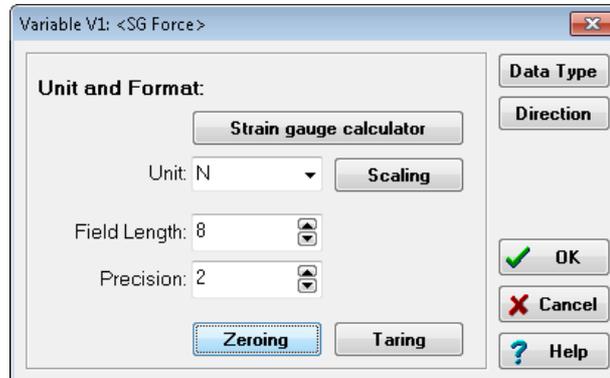


Abb. 5-5 Dialog for sensor scaling.

- Click on **Zero balance** or **Tare** to configure the relevant process.
- Select the variable created above as the control variable (Fig. 5-6).

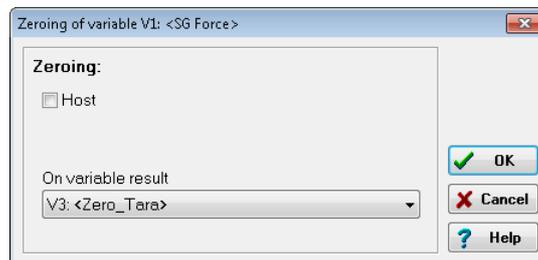


Abb. 5-6 Setting up zero balance or tare.

When the variable (Zero\_tare in this example) has certain values, taring or zero balancing is carried out or an existing zero or tare value is deleted (undo zero balancing/taring):

Value	Function
1	Perform taring when setting the value
2	Reset tare (delete tare value)
4	Start zero balance The mean is formed until the value 0 is written to the variable again.
8	Reset zero balance (delete zero value)

## 5.1.5

### Specifying digital inputs/outputs

In order to set parameters you should be connected to the module and have called the configuration program ICP 100. For configuration select the module you want from the list of modules. Then carry out all the module settings in the window that is then displayed.

All module signals are defined as variables. Therefore, for the entry activate the tab **Variable definition**.

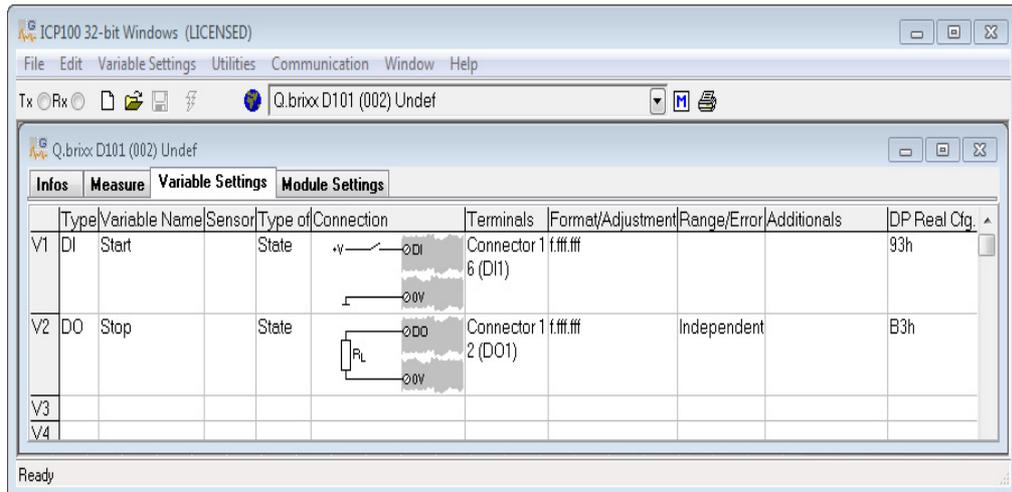


Abb. 5-7 Dialog with configuration for digital input and output.

#### Procedure

1. Click in the column **Type** of the first row (V1 = Variable 1) or mark the row (click on V1) and use **Variable definition > Type**.
2. Select **Digit. input** or **Digit. output**.  
The column **Wiring diagram** shows you the pin assignment. With more than one input the first inputs are also always occupied first (first Plug 1, then Plug 2, etc.). Check for correct connection.
3. Click in the column **Variable name** and allocate a name identifying the signal.
4. At a digital **output** click in the column **Type of** and specify whether you want to use the output as **Status indicator**, **Status field** or **Process output**.

**Process output:** The output monitors a module signal and changes the output level under certain conditions. Click in the column **Other** and specify the type of alarm monitoring.

You can specify up to four alarm conditions. When one of the conditions is satisfied (logical OR), the alarm signal is triggered.

To the left above the graphical displays select the levels at which switching is to occur and how they are to switch.

Enter the values for the switching thresholds in the (scaled) unit of the selected signal. Use either fixed values (constants) or arrange for the values to be determined by other variables.

*Status indicator:* The output can be set via a command from the EtherCAT master. Click in the column **Other** and specify the type of alarm monitoring.

5. Click in the column **Format/balance** to specify the transfer format.

Since digital signals do not require any **Decimal** places, you can enter **0** here. **1** is sufficient for the **Field length**. With a digital input you can also specify a unit (optional).

For several inputs/outputs and the type **Status field (Type of column)**, as well as the transfer as a number (e.g. as integer), there is also the type **Status field 32** with which all existing inputs or outputs are transferred as binary numbers. Define a suitable field length here depending on the number of inputs and outputs.

When the dialog is closed, the number of transferred places and the unit in the column **Format/balance** are displayed.

6. Click in the column **Range/error** to define the reaction in the case of an error for the digital outputs (optional).
7. Save the settings with **File > Send to module** or click on . You can also save the settings in a file on the PC using **File > Save to file** so that you can load this configuration in the module again later.

## 5.1.6

### Defining analog outputs

In order to set parameters you should be connected to the module and have called the configuration program ICP 100. For configuration select the module you want from the list of modules. Then carry out all the module settings in the window that is then displayed.

All module signals are defined as variables. Therefore, for the entry activate the tab **Variable definition**.

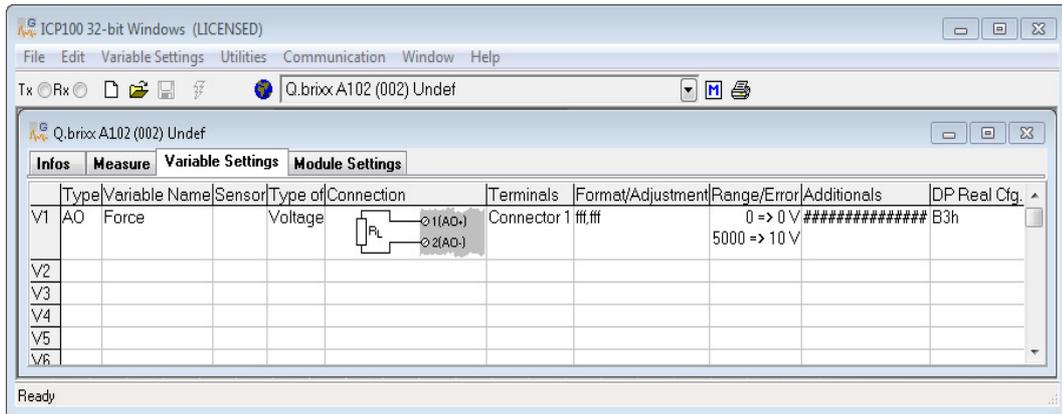


Abb. 5-8 Dialog with configuration for analog outputs.

## Procedure

1. Click in the column **Type** of the first row (V1 = Variable 1) or mark the row (click on V1) and use **Variable definition > Type**.
2. Select **Analog. Output**.  
The column **Wiring diagram** shows you the pin assignment. With more than one output the first outputs are also always occupied first (first Plug 1, then Plug 2, etc.). Check for correct connection.
3. Click in the column **Variable name** and allocate a name identifying the signal.
4. Click in the column **Type of** and specify whether you want to use the output as a **Voltage** or a **Current** output.
5. In the **Format/balance** column the output format is shown which has no further significance here.
6. Click in the column **Range/error** to define the output scaling and the reaction in the case of an error (optional).
7. Click in the column **Other** to specify the signal source (variable) used for the output.
8. Save the settings with **File > Send to module** or click on . You can also save the settings in a file on the PC using **File > Save to file** so that you can load this configuration in the module again later.

### 5.1.7

## Defining computations

In order to set parameters you should be connected to the module and have called the configuration program ICP 100. For configuration select the module you want from the list of modules. Then carry out all the module settings in the window that is then displayed.

All module signals are defined as variables. Therefore, for the entry activate the tab **Variable definition**.

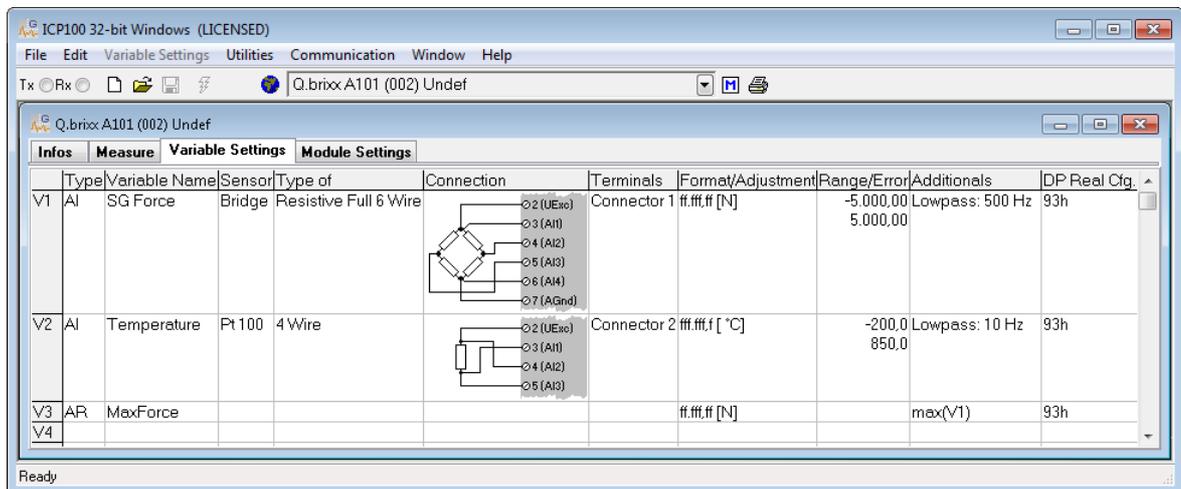


Abb. 5-9 Dialog with configuration for a computation (V4).

## Procedure

1. Click in the column **Type** of the first free row (in the illustration V4 = Variable 4) or mark the row (click on V4) and use **Variable definition > Type**.
2. Select **Arithmetic**.
3. Click in the column **Variable name** and allocate a name identifying the signal.
4. Click in the column **Other** and specify the required computation.

In the upper dialog field you can enter, as on a pocket calculator, a formula which uses the existing module variables. Create functions via the buttons in the lower section of the dialog. Click on **OK** once you have defined the required computation.

5. Click in the **Format/balance** column to specify the transfer format using the formats **Integer** (2 bytes) and **Long integer** (4 bytes).

Floating point numbers are always transferred as 4-byte values and further setting is not necessary here.

For the formats **Integer** and **Long integer** specify the number of **Decimal** places and the total number of places to be output (**Field length**). The field length is calculated including the points, but without any commas displayed for the thousands positions and it is only used for representation in one of the Gantner programs. Specifying three decimal places displays, for example, the value 1234 as 1,234.

After closure of the dialog the number of transferred places and the unit are displayed in the column **Format/balance**, e.g. **ff.fff.f [N]** for an output in the unit N with a total of seven

characters with one decimal place and the decimal separator. If negative numbers occur, the display in this example is limited to -9,999.9 (seven characters without the comma).

6. Save the settings with **File > Send to module** or click on . You can also save the settings in a file on the PC using **File > Save to file** so that you can load this configuration in the module again later.

### 5.1.8

#### Specifying the alarm monitoring

In order to set parameters you should be connected to the module and have called the configuration program ICP 100. For configuration select the module you want from the list of modules. Then carry out all the module settings in the window that is then displayed.

All module signals are defined as variables. Therefore, for the entry activate the tab **Variable definition**.

- ➔ In order to monitor a limit and to output a level on a digital output when an alarm occurs, you can directly use the function of the digital output. You do not need to set up any alarm monitoring. The alarm monitoring is used to monitor signals in the module and to make the result available to the PC or PLC as a preconditioned signal. Checking the original signal in the PC or PLC can therefore be omitted.

#### Procedure

1. Click in the column **Type** of the first row (V1 = Variable 1) or mark the row (click on V1) and use **Variable definition > Type**.
2. Select **Alarm**.
3. Click in the column **Variable name** and allocate a name identifying the alarm signal.
4. Click in the column **Other** and specify the type of alarm monitoring.

You can specify up to four alarm conditions. When one of the conditions is satisfied (logical OR), the alarm signal is triggered.

To the left above the graphical displays select the levels at which switching is to occur and how they are to switch. Enter the values for the switching thresholds in the (scaled) unit of the selected signal. Use either fixed values (constants) or arrange for the values to be determined by other variables.

5. Click in the column **Format/balance** to specify the transfer format.

Since the alarm signal, like digital signals, does not require any **Decimal** places, you can enter **0** here. **1** is sufficient for the **Field length**.

When the dialog is closed, the number of transferred places and the unit in the column **Format/balance**, e.g. **f**, are displayed.

6. Save the settings with **File > Send to module** or click on . You can also save the settings in a file on the PC using **File > Save to file** so that you can load this configuration in the module again later.

### 5.1.9

#### Firmware update

Recently purchased modules always contain the latest firmware, i.e. the software in the modules is the current version.

Please contact the Gantner Support (refer to Chapter 7, *Functional Procedures*, page 95) if you have any further queries about this.



## 6

## LabVIEW™

You have two ways of addressing the Q.bloxx modules with Q.bridge using LabVIEW™:

1. You use the Q.series driver VIs

This solution is primarily interesting if you already have existing LabVIEW™ applications which you want to expand or equip with new hardware.

2. You use the APPic Framework from APP Instruments

You can have APP Instruments produce a complete application for you or you just use the framework. The advantage is that the framework already comes with the solution for many problems and includes numerous functions which go way beyond pure measurement operation. For example, you can execute functional libraries in the background, establish communication between program sections, run program sections in parallel or establish communications amongst them through a network.

This chapter contains a description of the Q.series driver VIs and an explanation of the demo application which shows you how to use the VIs. It assumes that you are already familiar with LabVIEW™. Further information on LabVIEW™ can be found at [www.ni.com](http://www.ni.com) from National Instruments Corporation.

## 6.1

## The Q.series driver VIs

As usual in LabVIEW™, after activating the context help with a click on a VI or object, you obtain the explanation about its function and the inputs/outputs. Further information can also be found under [www.ni.com/getting-started/labview-basics/d/product-help](http://www.ni.com/getting-started/labview-basics/d/product-help).

## 6.1.1

## Q.series\_Initialize.vi



Abb. 6-1 VI for initialization.

The VI connects to the Q.bridge with the **Target Address** and switches it into the mode selected with **Controller Mode**. On selecting the Measurement mode the measuring rate (sample rate) is initialized in the default setting to 1000Hz with a block size of 100.

The **APPicLite** output must be passed on to the next VI.

## 6.1.2

## Q.series\_Condition.vi



Abb. 6-2 Vi for reading out Q.bridge settings.

The VI reads the following four items of information into the string array **Condition Info**:

1. Baud rate
2. Mode (Measurement, Configuration or Transparent)
3. DAQ status (Idle, Init, Run or Deinit)
4. Error status (APPicLite error code)

The **APPicLite Out** output must be passed on to the next VI.

## 6.1.3

## Q.series\_Mode.vi



Abb. 6-3 Vi for selecting the operating mode.

The VI switches the Q.bridge into the mode selected with **Controller Mode**.

Use the VI to switch between the modes Measurement, Configuration and Transparent in your application.

- ➔ The Transparent mode must be active so that other programs can connect to the Q.bridge.

The **APPicLite Out** output must be passed on to the next VI.

## 6.1.4

## Q.series\_ModuleLiveList.vi



Abb. 6-4 Vi for detecting the connected modules.

The VI reads out the following parameters of all connected modules (**Module Live List**):

- Module address (in the default setting this corresponds to the position from the left in the system carrier; the first module adjacent to the Q.bridge has the address 1).
- Module manufacturer
- Module type
- Hardware version

- Firmware version (software)
- Module serial number

The **APPicLite Out** output must be passed on to the next VI.

### 6.1.5

#### Q.series\_ChannelLiveList.vi

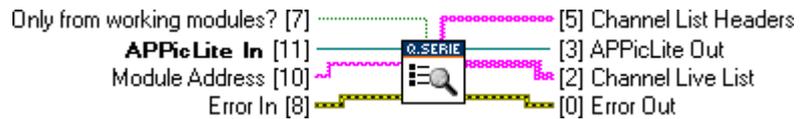


Abb. 6-5 VI for detecting the existing channels.

The VI reads (again) from the modules specified in the **Module Address** which channels (variables) are defined. If you do not specify an address, all connected modules are read out. If you set **Only from working modules?** to True, only those modules are read out which have the same baud rate as the Q.bridge. The following parameters are output in the **Channel Live List** (two-dimensional array):

- Module address (refer to Section 6.1.4, page 84)
- Variable name
- Variable type
- Data type of the variables
- Resolution/number of decimal places of the variables (precision)
- Unit of the variables
- Scaling factor and offset of the variables
- Channel resource, i.e. the channel “address”, consisting of the module address and position number of the channel in the module (Channel Resources in the Q.series\_ResourceList.vi)
- Channel type, i.e. which type the channel or variable has. Currently there are three types: **num\_in** for an input, **num\_out** for an output and **invalid** for all other cases.

The array **Channel List Headers** (single-dimensional array) contains the column names of the information items output in the **Channel Live List**.

The **APPicLite Out** output must be passed on to the next VI.

## 6.1.6

## Q.series\_ResourceList.vi

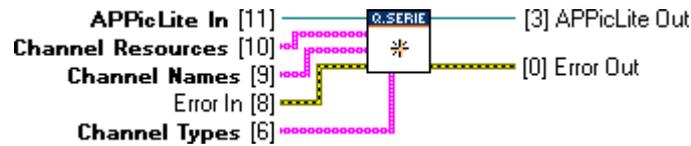


Abb. 6-6 VI for defining all existing channels.

In the Q.bridge the VI generates the list of the assignments of existing channels (variables) of modules to the LabVIEW™ channels.

**Channel Resources** are all channels of all modules which are connected to the Q.bridge.

**Channel Names** are the names used for this in the LabVIEW™.

**Channel Types** defines whether the channel can be used as a pure input (num\_in) or as an output (num\_out).

Use the following VI Q.series\_Getlist to transfer only certain channels during a measurement.

The **APPicLite Out** output must be passed on to the next VI.

## 6.1.7

## Q.series\_Getlist.vi

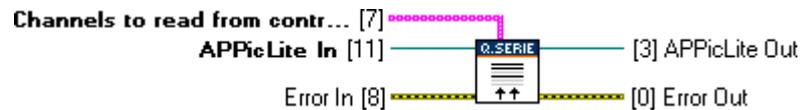


Abb. 6-7 VI for defining the required channels.

In the Q.bridge the VI generates the list of channels, the values of which are to be transferred.

The AVI output must be passed on to the next VI.

**i** Tip

The Q.bridge always contains all values of all channels of the connected modules. Use **Channels to read** to select only the channels, the values of which are actually required. This reduces both the bandwidth required for the transfer as well as the CPU load.

## 6.1.8

## Q.series\_Samplerate.vi



Abb. 6-8 VI for defining the measuring rate (sample rate).

The VI defines how often values are retrieved from the modules. You enter the frequency in Hz via the input **Samplerate**.

The **APPicLite Out** output must be passed on to the next VI.

### 6.1.9

#### Q.series\_Start.vi



Abb. 6-9 VI for starting the data transfer.

The VI starts the data transfer or data output. You must however still use the VI `Q.series_WaitForValidData` before you can transfer data, because the initialization phase of the Q.brixx modules must be awaited; refer to the following VI.

The **APPicLite Out** output must be passed on to the next VI.

### 6.1.10

#### Q.series\_WaitForValidData.vi



Abb. 6-10 VI for awaiting the initialization phase of the modules.

The VI waits until the initialization phase of the Q.brixx module has finished and valid data are available from the channels (variables) specified in the `Getlist` VI. It is only after this that you can retrieve data with the VI `Q.series_Read`. If the channels specified by the VI `Q.series_Getlist` do not send data within the number of milliseconds specified at **Timeout**, the output **Timeout?** is set to True.

- ➔ Switching from the Configuration or Transparent mode to the Measurement mode may take up to 20 seconds, because the modules reboot.

The **APPicLite Out** output must be passed on to the next VI.

### 6.1.11

#### Q.series\_Read.vi



Abb. 6-11 VI for reading the data.

The VI reads out the available data and is normally used in a loop. A two-dimensional array is output; for each channel there is one

row with the number of data items defined in **Readblock**. The data are transferred as 32-bit floating point values.

The number of values still in the output buffer is given in **Backlog**. The value should be smaller than the block size and not larger, because otherwise the transfer takes place too slowly and values are lost if the buffer overflows.

The **APPicLite Out** output must be passed on to the next VI.

### 6.1.12

#### Q.series\_GetBacklog.vi



Abb. 6-12 VI for checking the output buffer.

This reads the number of values in the output buffer. The value should be smaller than the block size and not larger, because otherwise the transfer takes place too slowly and values are lost if the buffer overflows.

The **APPicLite Out** output must be passed on to the next VI.

### 6.1.13

#### Q.series\_Write.vi

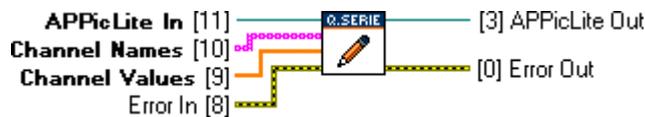


Abb. 6-13 VI for writing data to the modules.

The VI writes the values defined in **Channel Values** to the output channels specified in **Channel Names**. The channels must be of the type num\_out; refer to Q.series\_ResourceList.vi.

The **APPicLite Out** output must be passed on to the next VI.

### 6.1.14

#### Q.series\_Stop.vi



Abb. 6-14 VI for stopping the data transfer.

The VI stops the data transfer, also between modules and the Q.bridge.

The **APPicLite Out** output must be passed on to the next VI.

## 6.1.15

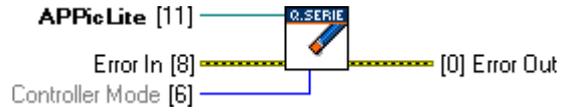
**Q.series\_Clear.vi**

Abb. 6-15 VI for terminating communication.

The VI resets the Q.bridge to the mode specified in the Controller Mode and terminates the communication (closes the connection). The default setting (no specification) is the Measurement mode.

**i IMPORTANT**

The Transparent mode must be active so that other programs can connect to the Q.bridge.

## 6.2 The demo applications

The demo applications do not use all the VIs possible. You can however easily follow the basic use of the VIs and their integration into an application.

To view and test one of the two examples open the project “Q.series Demo.lvproj” (Fig. 6-16).

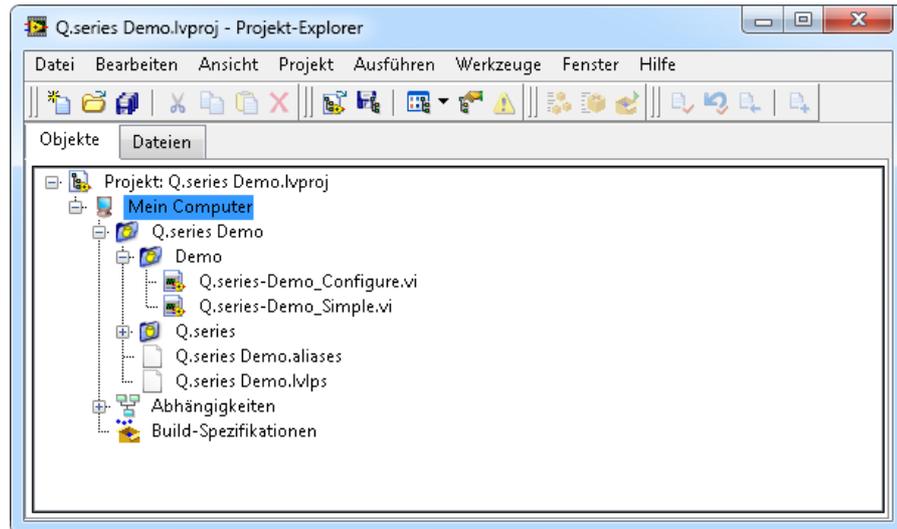


Abb. 6-16 Opening a demo project.

Then in the “Demo” group double click either on Q.series-Demo\_Configure.vi or Q.series-Demo\_Simple.vi, depending on which example you wish to open.

### 6.2.1 Configuring Q.brixx modules with Q.bridge

For an application for the configuration of the active channels which are to be transferred from the Q.brixx modules via the Q.bridge you have to employ the VIs basically in the following sequence (the VIs are given in brackets):

1. Establish connection to the Q.bridge (Initialize.vi).
2. Switch the Q.bridge into the Configuration mode (Initialize.vi).
3. Request the list of connected modules from the Q.bridge (ModuleLiveList.vi).
4. Request the list of the channels (variables) defined in the modules from the Q.bridge (ChannelLiveList.vi).
5. Reset the Q.bridge to the Transparent mode (terminate the task) and terminate the connection (Clear.vi).

The example Q.series-Demo\_Configure.vi shows the procedure. Enter the IP address of your Q.bridge (**IP Address of Controller**) and start the VI with a click on  (Fig. 6-17). The connected modules are shown in the upper field and the variables configured in the modules in the lower field.

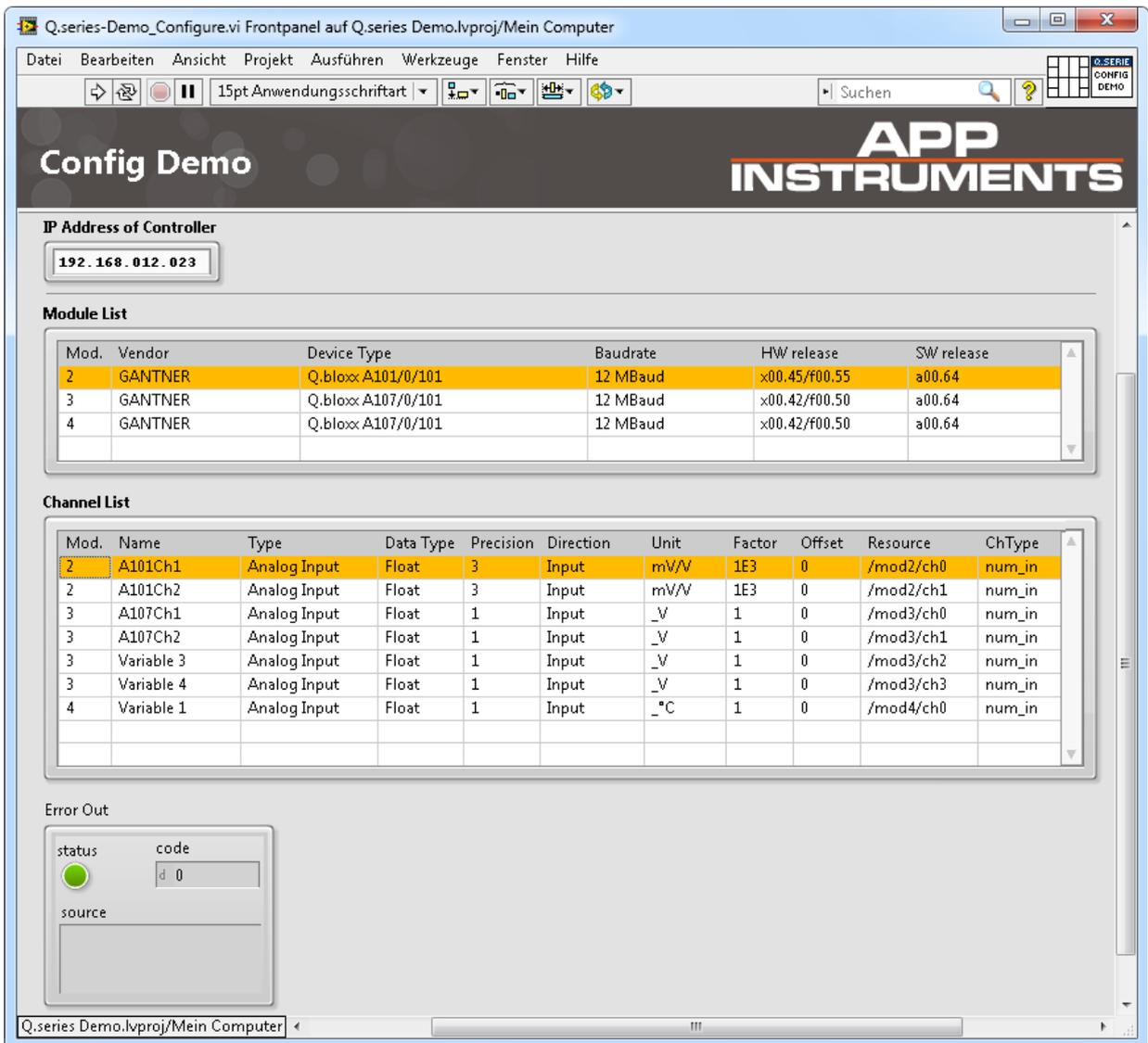


Abb. 6-17 Demo VI for configuration.

Call the block diagram with **Ctrl E** to view the functional principle.

## 6.2.2

### Carrying out a measurement with the Q.brixx modules.

For a measurement application with the Q.brixx modules using Q.bridge you have to employ basically the VIs in the following sequence (the VIs and block diagram labels are given in brackets):

1. Establish the connection to the Q.bridge and switch the Q.bridge into the Measurement mode (Initialize.vi, Create Task).
2. Set the list of channels (variables) to be transferred (ResourceList.vi, Create Channel).
3. Set the sample rate (Samplerate.vi, Samplerate).
4. Start the measurement (Start.vi, Start).
5. Wait until the modules are ready (WaitForValidData.vi, Wait for Modules).
6. Read in (and process) the data in a loop (Read.vi, Read Loop).
7. Stop the measurement at the end of the application (Stop.vi, Stop).
8. Reset the Q.bridge to the Transparent mode (terminate the task) and terminate the link (Clear.vi, Clear).

The example Q.series-Demo\_Simple.vi shows the procedure. Proceed as follows to run the example:

1. Enter the IP address of your Q.bridge (**IP Address Of Controller**).
2. Specify the channels to be displayed at **Channels**. The specification must use the same name as is shown in the **Resource** column in the example Q.series-Demo\_Configure.vi; refer to Fig. 6-17.
3. Click on .

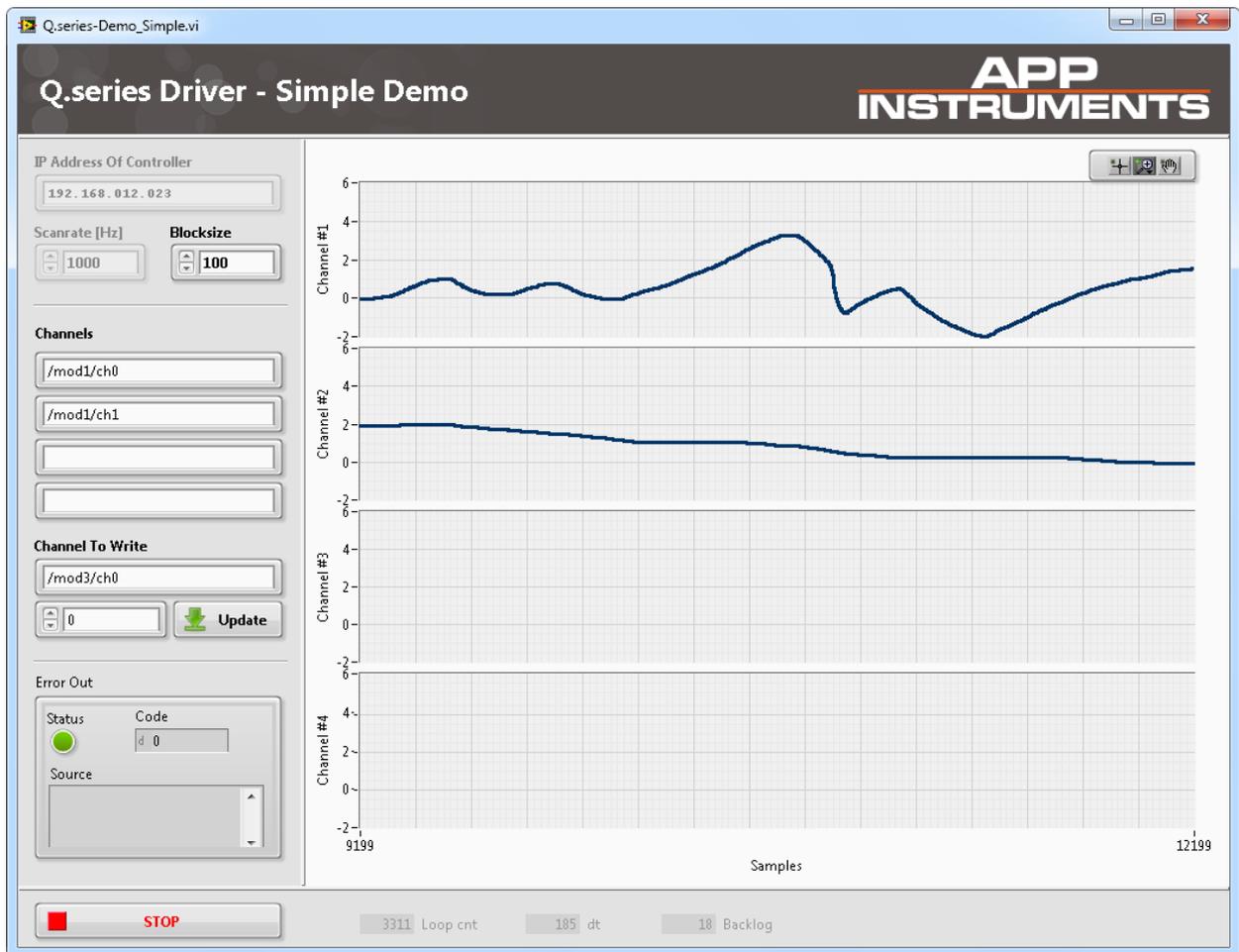


Abb. 6-18 Demo VI for measurement.

Call the block diagram with **Ctrl E** to view the functional principle.

Click on **STOP** to terminate the VI.



# 7

## Functional Procedures

This chapter explains various important settings and processes more comprehensively than in the previous chapters, for example, to provide you with decision-making aids for the interface parameters or the settings of the modules.

### 7.1

#### Ethernet on the PC

The following sections describe various settings which you can carry out on the PC to enable a link to be formed. The images use menus and dialogs found in Windows XP; the names of the dialogs and fields in other versions of Windows are however similar and are usually also given.

#### 7.1.1

##### Finding the IP address and subnet mask of the PC

In Windows 7 or 8 open the **Network and Sharing Center**, e.g. using  at the bottom on the right in the taskbar. Click on the **LAN connection** (the name may be different) through which the Test Controller is connected to the PC (Fig. 7-1 on page 96). In the following status dialog (similarly in Fig. 7-1) click on **Details**. The current address is displayed in the next dialog under **IPv4 address**.

The subnet mask determines which addresses can be reached from the PC: Only addresses whose figures are identical in the places which contain a 255 in the subnet mask can be reached. The IP addresses of the PC and Test Controller should normally be located in the same Ethernet segment (only the last group of figures in the IP address is different), otherwise the subnet mask must be 255.255.0.0 so that the last *two* groups of figures may be different.

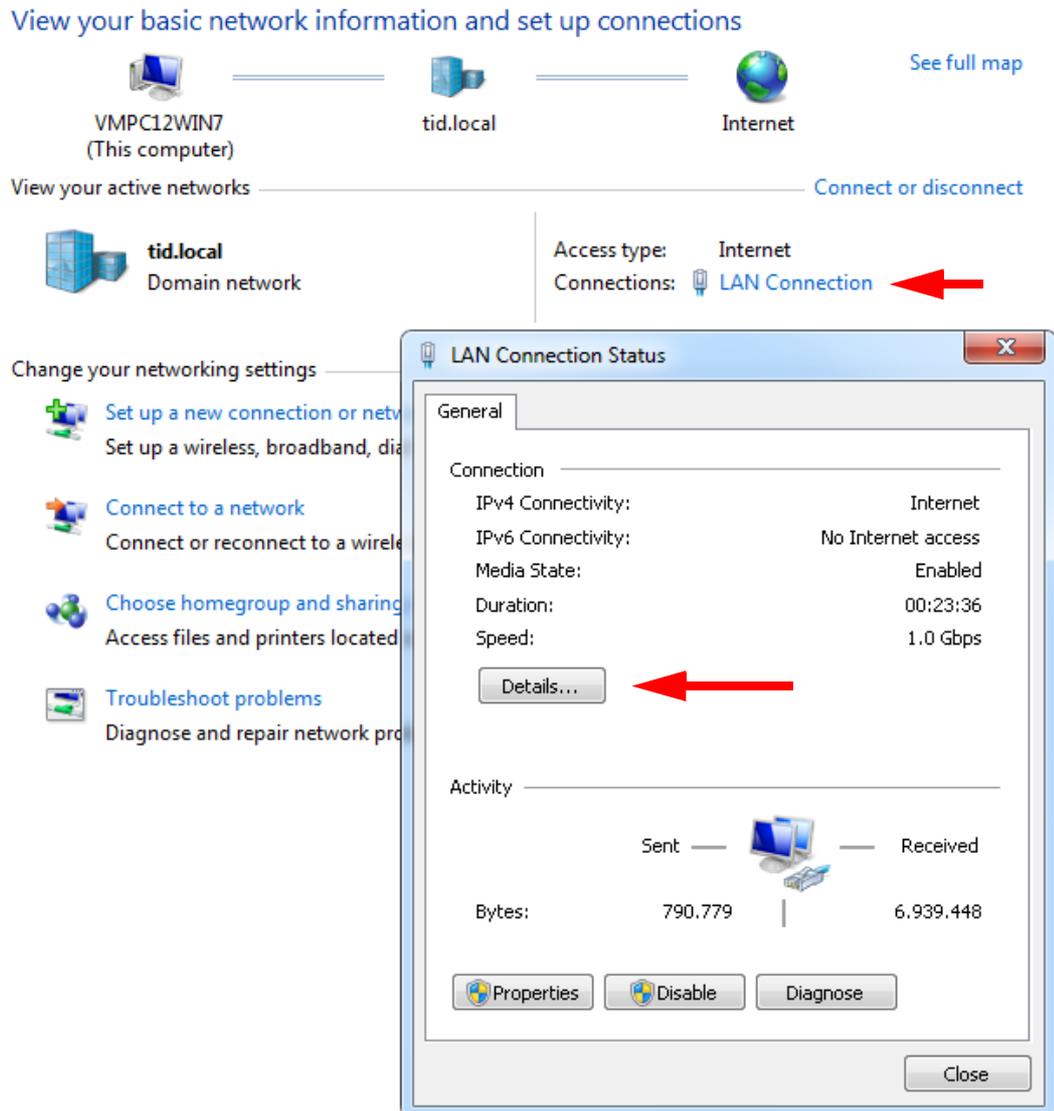


Fig. 7-1 Viewing/changing the IP address of the PC

#### Example 1

Subnet mask 255.255.255.0, IP address 192.168.100.26

Only addresses can be reached which start with 192.168.100, i.e. the first three groups of figures must be identical and only the fourth may be different.

#### Example 2

Subnet mask 255.255.0.0, IP address 192.168.100.26

All addresses can be reached which start with 192.168, i.e. the third group of figures may also be different between the PC and Test Controller.

### 7.1.2

#### Setting the IP address on the PC

If you want to connect to a Test Controller, you must assign a (temporary) IP address to the PC.

- ➔ We recommend that a temporary IP address is set up on the PC, because then the network settings on your PC for the normal connections are not changed. If you have already set up this type of “alternative configuration” for another network, you must note the existing settings so that you can restore them after concluding the configuration of modules or the Test Controller.

In Windows 7 or 8 open the **Network and Sharing Center**, e.g. using  at the bottom on the right in the taskbar. Click on the **LAN connection** (the name may be different) through which the Test Controller is connected to the PC (refer to Fig. 7-1 on page 96). In the following status dialog click on **Properties** (requires administrator rights). Then mark **Internet Protocol Version 4** and click on **Properties** (refer also to Fig. 7-2). Then proceed to the register card **Alternative Configuration** and specify an address for the PC, e.g. **192.168.100.5**, and a subnet mask, e.g. **255.255.255.0** (Fig. 7-3).

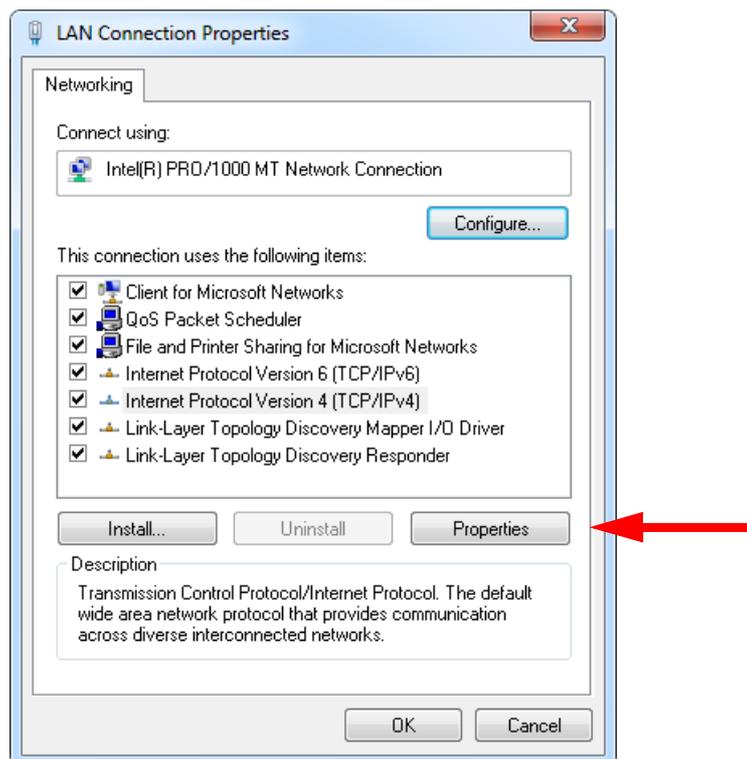


Fig. 7-2 LAN connection properties (Windows 7 and 8)

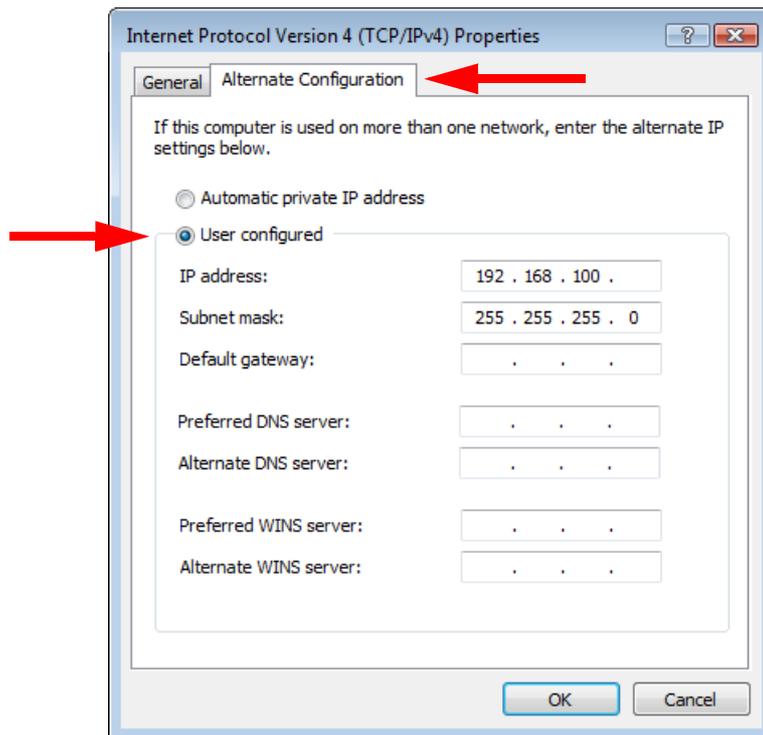


Fig. 7-3 Specifying the IP address and subnet mask for an alternative (temporary) configuration.

### 7.1.3

#### Allowing access to network devices (firewall)

Generally, a firewall monitoring access of the PC to the network and vice versa is installed on the PC. Therefore, you must allow access to the Test Controller or the module, otherwise no connection can be established via Ethernet. On the first attempt to establish a connection you receive a message similar to that shown in Fig. 7-4. Click on **Unblock** to allow the connection.

#### **i** IMPORTANT

You must possess administrator rights on the PC to be able to unblock the connection. If this is not the case, ask your administrator to do this for you. You must enable all programs for sharing which use an Ethernet connection to the modules or the Test Controllers.

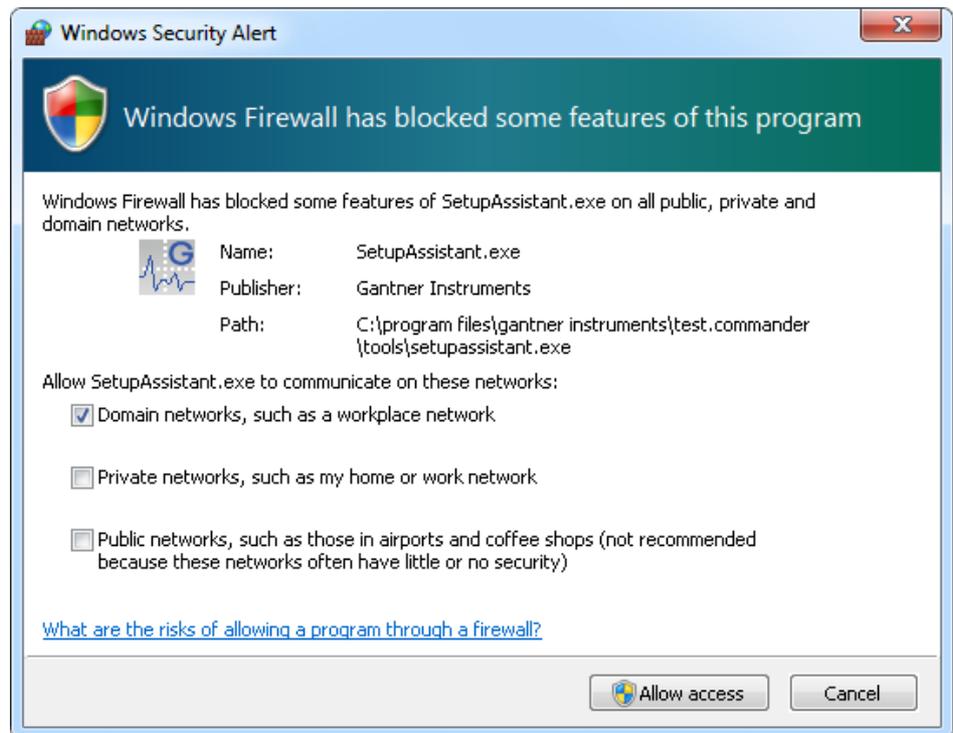


Fig. 7-4 Windows firewall message on attempting to establish an Ethernet connection.

## 7.2

### Connecting sensors with sensing leads

Resistive sensors require an excitation voltage to be able to provide their output signal. For sensor excitation a current is passed through the connecting lead, which however causes a loss of voltage due to the resistance of the connecting lead. Consequently, the sensor is then not supplied with the voltage set on the amplifier module, but rather with a slightly lower voltage. This leads in turn to a lower output signal and, depending on the cable resistance, losses in the single-figure percentage range can occur even with just a few meters. Therefore, high quality amplifier modules for the excitation of resistive sensors use so-called sensing leads which can measure the loss of voltage, since only a very small current flows in them. This is because the inputs for the sensing leads have very high input resistances (usually over  $10^6 \Omega$  compared to a sensor resistance of a few  $100 \Omega$ ). The amplifier module can therefore acquire the voltage arriving at the sensor error-free and increase its excitation voltage to compensate for the losses in the connecting cable. This is particularly the case when the temperature of the connecting cable changes. In this case the cable resistance changes and the sensor output signal would therefore also change if no sensing leads were used.

We therefore recommend the use of sensing leads. This is mainly necessary when several meters of cable are used, low measurement deviations are to be obtained or when the temperature of the cable may vary.

## 7.3

### Sensor scaling

Depending on the type of transducer (Sensor type), you have various possible scalings available. With voltage signals and strain gauge bridges (Bridge), you can define a conversion of the measured voltage (volts or mV/V) into a physical unit, e.g. in newtons. With strain gauges a special conversion tool is available to you.

Click in the column **Format/balance** of the variables to be set to call up the setup dialog (Fig. 7-5).

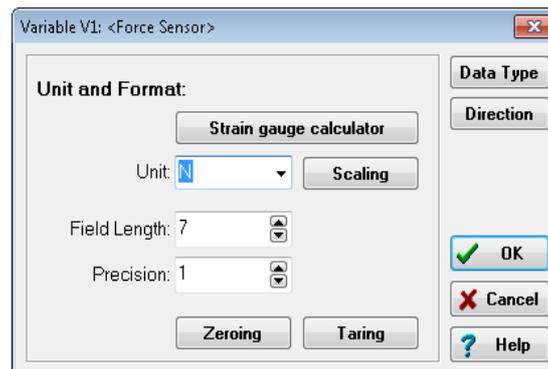


Fig. 7-5 Setup dialog for scaling.

#### 7.3.1

### Scaling of voltage signals and strain-gauge bridges

1. In the **Unit** field enter the required physical unit, e.g. **N**.  
If the unit has already been entered, you can select it from the list box.
2. Click on **Scaling**.  
The scaling dialog is displayed.
3. Enter the transducer (sensor) data from the calibration certificate or from the data sheet (example: refer to Fig. 7-6 on page 102).

Instead of the full scale readings in the positive and negative directions, you can also enter just one direction. Then in each case use **0** for **Measurement** and **Displayed value** at **Point 1**.

An alternative is the entry of **Factor** and **Offset** if these data have been specified for your sensor.

The numbers in the **Display** field depend on the settings in the **Range/error** column.

4. Close the scaling and setup dialog with **OK**.

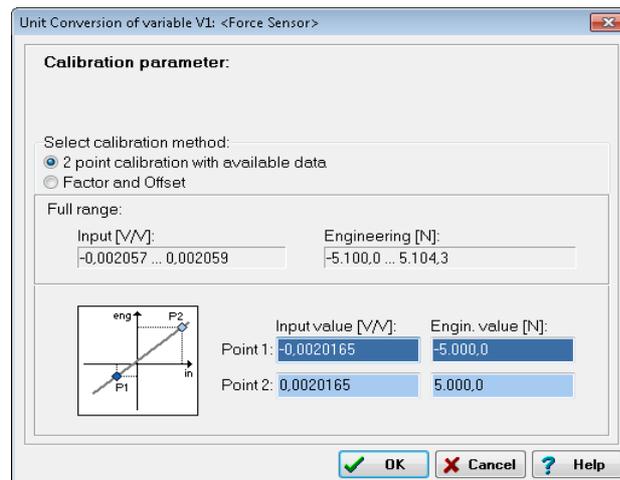


Fig. 7-6 Scaling dialog

## 7.3.2

## Scaling strain gauges

1. Click on **Strain-gauge calculator**, the unit is then automatically changed to  $\mu\text{m}/\text{m}$ .
2. Enter the gauge factor of your strain gauge in the left field. The gage factor is a measure of the sensitivity of the strain gauge and is stated on each strain-gauge pack. It is usually between 1.8 and 2.2. Fig. 7-7 shows scaling with  $k = 2.03$ .
3. If you are using more than one active strain gauge in your bridge circuit, you must also state the resulting bridge factor (right field). The factor depends on the orientation of the strain gauge on the measurement object and, where applicable, also on the Poisson's ratio for the material. On a tension/compression bar the bridge factor is, for example, approx. between 2.5 and 2.8 depending on the material.
4. Close the scaling and setup dialog with **OK**.

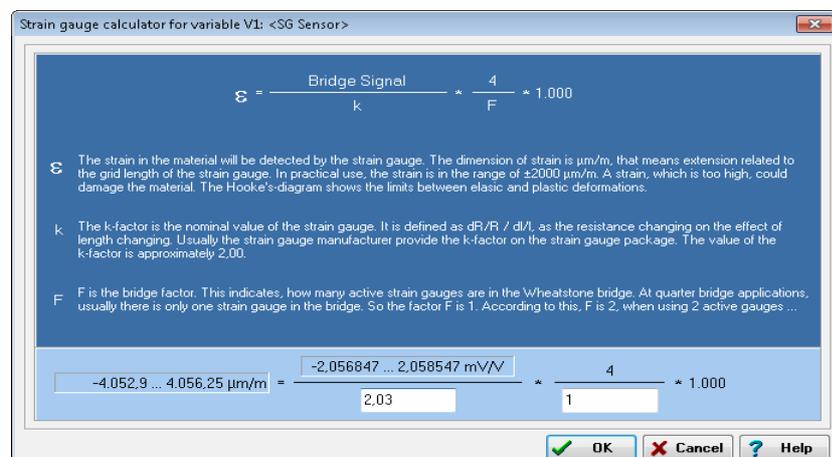


Fig. 7-7 Scaling dialog for strain gauges.

## 7.4

### Current measurement with an external shunt

Current measurements are carried out by measuring the voltage drop across a resistance of known size (shunt resistance). In the Q.brixx modules, which are suitable for direct current measurement, this is a resistor of  $50\Omega$ , with which you can measure currents up to 25mA (the maximum shunt power dissipation is limited to 0.25W). Higher currents need an external shunt which is looped into the line to be measured. The power dissipation occurring at the current to be measured must be lower than the permissible power dissipation of the external shunt. In addition the voltages produced on the resistance must not exceed the permissible input voltage on the analog input of the Q.brixx module. Configure the analog input as a voltage input and divide the measured voltage by  $R_{\text{ext}}$ .

---

**i** **IMPORTANT**

The error in the current measurement using an external shunt depends on the accuracy of the resistor used.

---

## 7.5

### Measuring with thermocouples

Thermocouples consist of two “thermoelectric wires” which are formed from different materials, e.g. platinum and platinum/rhodium, and are joined together at one end, usually by welding. If this contact point and the other ends of the thermoelectric cables have different temperatures, a “thermoelectric voltage” is produced at the contact point. This voltage is essentially proportional to the temperature difference between the contact point and the ends of the cables.

Since thermocouples only measure a temperature difference (difference between the temperature at the contact point and the measured temperature at the terminal strip on the Q.brixx module), the terminal temperature must be known or the “transition” from the thermocouple cable or compensating cable to the copper cable must occur at a known temperature level. The first case is known as internal cold junction compensation ( $TC_{int}$ ) and the second case as external cold junction compensation,  $TC_{ext}$ .

To acquire the temperature with internal cold junction compensation an additional temperature probe is used which measures the reference temperature. For the Q.brixx modules a cold junction compensation terminal with an integrated Pt1000 temperature probe is used. In this way, the temperature at the “transition point” is determined and the voltage produced by the thermocouple is corrected depending on the type of thermocouple.

To measure the temperature using external cold junction compensation, a second thermocouple of the same type is needed which is connected in series with the first one. The polarity is chosen such that the thermoelectric voltages subtract. The second thermocouple is located at a fixed reference temperature (usually 0°C). Then, the Q.brixx module calculates the temperature at the measuring point based on the linearization curve. However, the Q.brixx module requires the information of which reference temperature (cold point temperature) is being used.

## 8

# International Sales and Service

The current addresses of our sales partners can be found in the Internet on our web site. You can take up direct contact with Gantner Instruments GmbH at any time.

You will find further information in the section Technical Information in our Wiki at <https://dev.gantner-instruments.com/doku-wiki>. The user name is **support** and the password is **gins** (not all sections are open to the public). Alternatively, the Wiki from APP Instruments for questions concerning LabVIEW™ is also available to you: <http://support.app-instruments.com/dokuwiki>, User name **support**, Password **appins**.

## Austria

Gantner Instruments GmbH  
Montafonerstr. 4  
6780 Schruns/Austria  
Tel.: +43 (0) 5556 77463-0  
Fax: +43 (0) 5556 77463-300  
E-mail: [office@gantner-instruments.com](mailto:office@gantner-instruments.com)  
Web: [www.gantner-instruments.com](http://www.gantner-instruments.com)

## Germany

Gantner Instruments Test & Measurement GmbH  
Heidelberger Landstr. 74  
64297 Darmstadt  
Tel.: +49 (0) 6151 95136-0  
Fax: +49 (0) 6151 95136-26  
E-mail: [testing@gantner-instruments.com](mailto:testing@gantner-instruments.com)  
Web: [www.gantner-instruments.com](http://www.gantner-instruments.com)

Subject to change in the course of further technical development

© 2015 Gantner Instruments GmbH

Vers. No. 1.0  
Released: 13/4/2015  
Printed: 4/2015

#### **Austria**

Gantner Instruments GmbH  
Montafonerstr. 4  
6780 Schruns  
Tel.: +43 (0) 5556 77463-0  
Fax: +43 (0) 5556 77463-300  
E-Mail: [office@gantner-instruments.com](mailto:office@gantner-instruments.com)  
Web: [www.gantner-instruments.com](http://www.gantner-instruments.com)

#### **Germany**

Gantner Instruments Test & Measurement GmbH  
Heidelberger Landstr. 74  
64297 Darmstadt  
Tel.: +49 (0) 6151 95136-0  
Fax: +49 (0) 6151 95136-26  
E-Mail: [testing@gantner-instruments.com](mailto:testing@gantner-instruments.com)  
Web: [www.gantner-instruments.com](http://www.gantner-instruments.com)