Gantner instruments

Q.series

# Manual

## Q.station 101


Vers. No. 1.1

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# 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.

## 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 engi-

neering 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

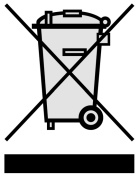
The modules or devices do not need any servicing. Cleaning may only take place in the voltage-free state. Therefore follow the points below:

- 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 Label on the module

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.

## 2.2 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.

| | |
|---|---|
| *italics* | signifies highlighted text |
| ***interface*** | signifies entries and entry fields in program user interfaces |
| **Options** | signifies menu items in the program user interfaces |
| **>** | signifies a sequence of menu items, e.g. in **Options > Settings** |
| ➡ | indicates special features or restrictions |

# 3 Introduction

Dear Customer,

Thank you 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 7). 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).

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## 3.1 The documentation of the Q.station

The documentation for the Q.station consists of this manual. A further manual is obtainable for the modules to be connected to the Q.station.

You will find this manual also as a PDF file on our home page www.gantner-instruments.com and on the Gantner CD enclosed with your Q.station 101 or which you can order free of charge from Gantner Instruments GmbH.

## 3.2 About this manual

This manual describes the installation, operation and configuration of the Q.station using the test.commander program. The programming of the Q.station 101 with the test.con program is described in a separate manual.

The manual is divided into several chapters:

- Safety information in Chapter 1, page 7ff.
- A description of the labels and symbols used on the Q.station and in this documentation can be found in Chapter 2, page 11ff.
- An overview, showing a complete system (including modules) and which variants are available, can be found in the next section.
- The description of the terminal assignments on the inputs and outputs can be found in Chapter 4, *Operation and displays*, page 17ff.
- Chapter 5, *Q.station 101 connection*, describes how you establish the connection to a PC, how you synchronize several Test Controllers and how you carry out a firmware update when required (page 25ff.).
- The basic configuration of your system, which settings you have to make via the test.commander program so that you can carry out measurements, is explained in Chapter 6, *Basic configuration of your system*, page 41ff.).
- The settings for recording data using one of the integrated data loggers as well as examples of logger configuration are included in Chapter 7, *Recording with the data logger*, page 67ff.
- Chapter 8, *Access to data in the Q.station*, describes how you can remotely access the data on your Q.station (page 95ff.).

## 3.3 System description

The modules in the Q.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 individual modules can be combined with the Q.station 101 to form one system as required. You can connect up 64 modules to a Test Controller Q.station and then address them from a PC or PLC via a single interface.

The Q.station 101 is obtainable in four variants:

| Type | VGA display 480x640, touch screen | PAC, graphically programmable with test.con, HMI Designer |
|---|---|---|
| Q.station 101 | – | – |
| Q.station 101 T | – | X |
| Q.station 101 D | X | – |
| Q.station 101 DT | X | X |

All variants are described in this documentation. The sections on the display are not relevant for the variants without a D.

#### Application of the Q.station 101

The Q.station Test Controller is a programmable module with 1 Gbyte of RAM and an internal hard disk of which 1 Gbyte is available for data storage using logger functions. The Test Controller can be configured and programmed over wide ranges and also offers a graphical display. Optionally, you have EtherCAT slave, standard Ethernet with 1 Gbyte/s, USB interfaces, CAN bus and a web server available.

You can connect up to 16 measurement modules to each of the four serial interfaces (UARTs) of the Q.station Test Controller (Fig. 3-1, page 16). This means that 8 channels can be acquired at 100 kHz sample rate per UART.

| | |
|---|---|
| UART data throughput at 24 MBaud<br>Sample rate 10 kHz<br>Sample rate 100 kHz | <br>128 channels<br>8 channels |
| Ethernet data throughput (transmission rate with block transfer) | 512 real variables (10 kHz)<br>32 real variables (100 kHz) |
| EtherCAT data throughput (transmission rate) | Read 253 values and write 253 values at 10 kHz, cycle time ≥ 100 µs |
| Interfaces | Ethernet, EtherCAT, 4x UART, 1x CAN bus, SD card, 2x USB 2.0 with up to 4 Mbyte/s |
| Max. number of slaves | 64 |

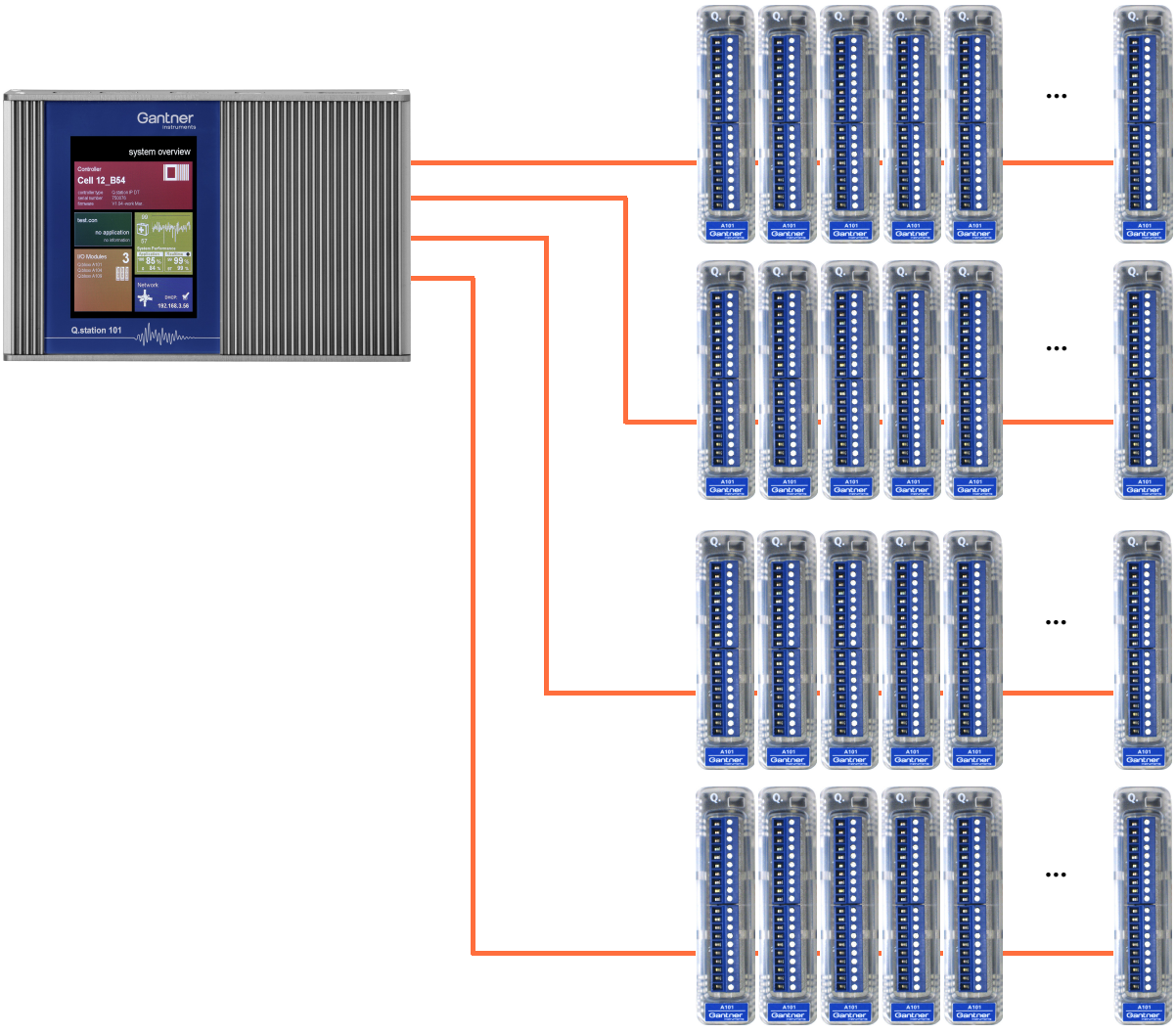



*Fig. 3-1 Q.station 101 with up to 64 modules.*

# 4 Operation and displays

This chapter contains the description of the connections (pin assignments), of the LED indicators and the functional operation of the LCD displays (optional component).

## 4.1 Mounting

The Q.station Test Controller can be directly plugged onto a mounting rail (35 mm DIN rail according to DIN EN 60715).

## 4.2 Terminal assignment

The Q.station 101 offers you eight digital inputs and four digital outputs, one CAN bus interface, two USB 2.0 interfaces and the possibility of inserting an SD card as storage expansion. The connector strips for the digital inputs/outputs and the power supply are divided up into two 10-pole plugs (Fig. 4-2).

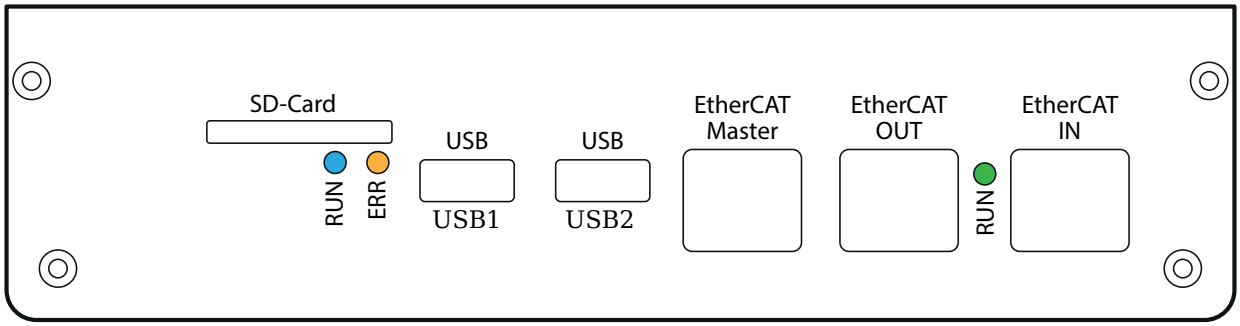



*Fig. 4-1 Terminal arrangement on the Q.station 101 (top).*

**IMPORTANT**
When accessing the Q.station 101 by FTP, USB1 is displayed as USB0 and USB2 as USB1.

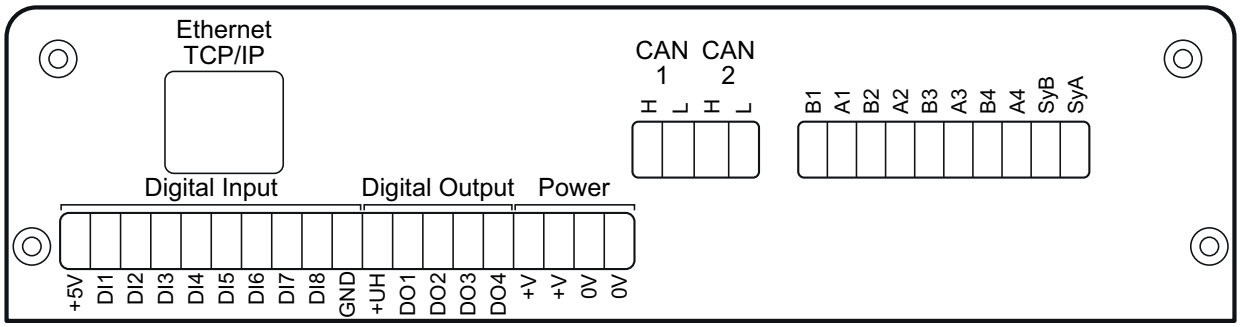



*Fig. 4-2 Terminal arrangement on the Q.station 101 (bottom).*

### CAN bus

| CAN bus pin assignment | | Meaning |
|---|---|---|
| CAN 1 | H | CAN1 High |
| CAN 1 | L | CAN1 Low |
| CAN 2 | H | Not yet available |
| CAN 2 | L | Not yet available |

*Fig. 4-3 Terminal assignment of the plug-in terminal for the CAN bus of the Q.station 101 Test Controller.*

We recommend only using screened CAN bus cables and that the screen is connected flat on the control cabinet frame.

### UARTs

| Pin assignment of Q.station 101 UARTs | |
|---|---|
| UART 1 B (B1)<br>UART 1 A (A1) | Max. 16 modules |
| UART 2 B (B2)<br>UART 2 A (A2) | Max. 16 modules |
| UART 3 B (B3)<br>UART 3 A (A3) | Max. 16 modules |
| UART 4 B (B4)<br>UART 4 A (A4) | Max. 16 modules |
| Sync B (SyB)<br>Sync A (SyA) | Input/output for synchronization, e.g. with another Test Controller |

*Fig. 4-4 Terminal assignment of the plug-in terminal for the UARTs of the Q.station 101 Test Controller; refer to Fig. 4-2 for the position of the connector strip.*

The connection of the Q.bloxx modules is described in the Q.bloxx manual.

### Digital inputs

| Digital input plug assignment |
|---|
| +5 V auxiliary voltage for digital inputs |
| DI1 |
| DI2 |
| DI3 |
| DI4 |
| DI5 |

| Digital input plug assignment |
|---|
| DI6 |
| DI7 |
| DI8 |
| Digital input 0V, GND |

*Fig. 4-5 Terminal assignment of the plug-in terminal for the digital inputs of the Q.station 101 Test Controller.*

You can freely assign the digital inputs using the test.commander (Section 6.3, page 53). The DIO1 input must be used if you want to set up synchronization through IRIG-B and digital inputs. You can select the input level in the test.commander between TTL (switching level <1 V and >3.5 V) and PLC (switching level <7 V and > 8 V) (**Settings > General remarks > Digital input switching threshold**; refer to Section 6.1.1, page 43).

### Digital outputs and power supply

| Pin assignment for digital output and power | |
|---|---|
| +UH (Power supply, max. 30$V_{DC}$, 100mA) / Live signal | |
| DO1 | Live signal |
| DO2 | Control, freely selectable |
| DO3 | Control, freely selectable |
| DO4 | Control, freely selectable |
| OH (Digital output 0V) | |
| Supply +10 to 30 $V_{DC}$ | Both terminals are connected together internally |
| Supply +10 to 30 $V_{DC}$ | |
| 0V | Both terminals are connected together internally |
| 0V | |

*Fig. 4-6 Terminal assignment of the plug-in terminal for the digital outputs and the power supply of the Q.station 101 Test Controller.*

The Live signal (life sign; refer to Section 6.1.1.2, page 44) is present either as a TTL level between +UH and OH or – if a voltage >5 V is applied between these terminals – it is output with this voltage as a voltage excursion on DO1. You can freely assign the digital outputs of the Q.station 101 Test Controller using the test.commander (Section 6.3, page 53).

The terminals for the power supply are provided doubled so that you can in each case use just one or both terminals.

**Tip**

Use the doubled terminals, for example, to link the supply voltage from here to the connected modules.

An unregulated direct voltage between 10 and 30 volts is needed for the power supply. The Q.station 101 needs approx. 12 W of available power. The power required is almost constant over the complete voltage range.

## 4.3 Interfaces, SD card

### 4.3.1 Ethernet connection

The Ethernet sockets use the standard pin assignment and you can directly insert standard Ethernet cable (RJ45). Cross cables are not needed and, if required, the switchover takes place automatically in the Q.station 101.

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

### 4.3.2 USB connection

The pin assignment of the USB sockets is as usual, so you can directly insert appropriate USB memory sticks. The memory sticks must be formatted with FAT32 or NTFS; other formats are not allowed.

**NOTICE**

The interface can be loaded with up to 100 mA. Use a separate power supply for devices with a higher current requirement (also start-up current), e.g. external hard disks.

The maximum transfer rate is approx. 4 Mbyte/s where this is supported by the connected memory device.

### 4.3.3 SD card

You can use all commercially available standard SD cards which are formatted with FAT32.

➡ We recommend SDHC cards Class 10 from SanDisk or PNY with a writing speed of more than 30 MB per second, e.g. the 16 GB card from PNY with a data rate of up to 100 MB per second. Note that the speed stated on the cards is only the peak speed. The figure says nothing about the continuous transfer rate, i.e. whether you can save with this speed over a longer time period. Also, the speeds for reading and writing (usually lower) are often stated separately.

# 4.4 LED flashing frequency

## 4.4.1 Flashing frequency of the Q.station 101

### 4.4.1.1 No error, everything OK

The blue LED (RUN) lights permanently, the orange LED (ERR) is off.

### 4.4.1.2 Storage to external memory running

The blue LED flashes quickly. You can remove the storage medium, e.g. a USB stick, when the flashing stops.

### 4.4.1.3 Error

The blue LED lights permanently and the orange LED flashes (one flash with a pause in each case).

Read out the error status via the test.commander; refer to Section 6.5.4, *Reading status information* on page 62.

### 4.4.1.4 Firmware error

The orange LED lights permanently: The firmware could not be loaded.
The blue LED is off permanently: The FPGA cannot start the firmware.

Try a restart. If this does not help, please contact our Support. In most cases the system can be reset by a service script which is located in the subfolder *Additional* of the installation directory. Copy the script to a USB memory stick which you insert before switching the Q.station on.

➡ Both the orange and the blue LEDs may light continuously. If this occurs for longer than about two minutes, the firmware update could fail. Try to carry out the update again or contact our Support.

## 4.4.2 Module flashing frequency

The modules have three LEDs: one blue LED on the upper edge and one red LED per connector strip. In normal operation the blue LED lights, but the red LEDs do not light. Depending on the error, the 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.

#### 4.4.2.1 SOS, configuration error

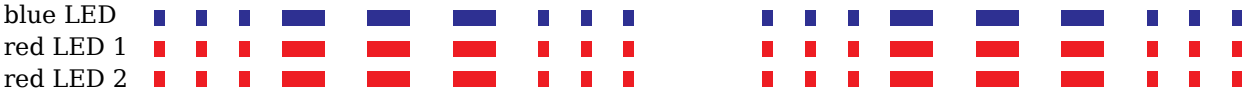



*Fig. 4-7 Flashing sequence with an incorrect module or when there are no settings in the base.*

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 6, *Basic configuration of your system*, page 41). The (new) configuration is then automatically saved in the base.

#### 4.4.2.2 Firmware download


*Fig. 4-8 Flashing sequence on downloading the module firmware.*

The LEDs flash while the firmware download into the module is taking place.

#### 4.4.2.3 Activating the firmware download

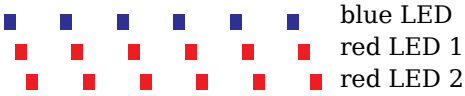



*Fig. 4-9 Flashing sequence on activating the firmware.*

The LEDs flash while the firmware is being configured after a download. After the download the module must be restarted.

#### 4.4.2.4 Problems during data transmission

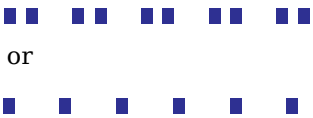



*Fig. 4-10 Flashing sequence for problems during the data transmission.*

These flashing sequences indicate a problem with the communication. Check the following:

1. Is the interface link between the modules in order (are the bases plugged together or connected to the cables correctly)?
2. Is the interface link between the modules and the Test Controller in order?
3. Is wiring of the interface connections correct?

Then restart the system (by switching off, waiting one minute and then switching on again). If these measures do not remedy the error, then contact your customer consultant or Gantner Instruments GmbH directly.

#### 4.4.2.5 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.

## 4.5 LCD screen

The capacitive touch screen can be operated by directly tapping the required option.

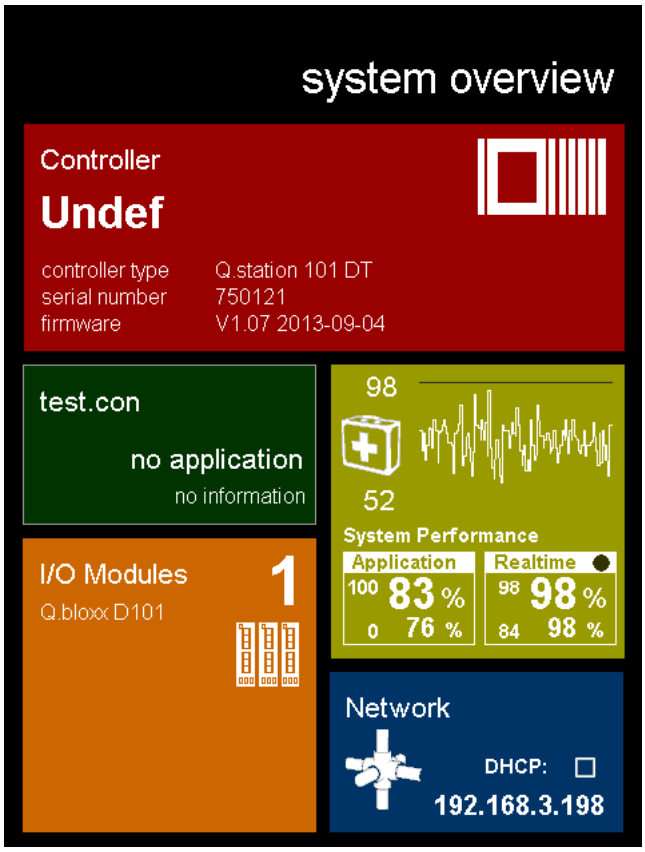



*Fig. 4-11 Q.station 101 start screen.*

In the factory setting there are five different tiles:

- ***Controller*** with information on the type, serial number and firmware version. Tap on the tile to show further data, e.g. the active channels and their measurements.
- A tile for ***test.con***. If displays have been defined in this program, they can be seen here or on the following screens.
- ***I/O modules*** with the number and type of the connected or found modules. Tap on the tile to call the overview and to select individual modules or channels for display (also as graphs).
- A tile for the display of data, e.g. as a graph.
- ***Network*** with the settings for the network interface. Tap on the tile to show also the subnet mask and gateway address or to be able to change the settings.

Via test.con you can define further tiles or modify the display.

# 5 Q.station 101 connection

This chapter contains the description of how you connect the Q.station 101 to a PC.

Refer to the Q.bloxx manual for connection of the Q.bloxx modules.

If you are using one of the versions Q.station 101 D or Q.station 101 DT, you can enter the IP address via the display. Otherwise you must first establish communication once only with the Q.station 101 via the test.commander program. This can take place via a fixed IP address or the automatic address allocation (DHCP). If necessary, you can then allocate a fixed address for further operation to the Test Controller; refer to Section 6.1.3.2, page 47.

## 5.1 Connect Q.station to Ethernet network with server

In the factory setting the Test Controller Q.station 101 uses DHCP (Dynamic Host Configuration Protocol), i.e. it receives a valid network address from a server which is present in the network. If you connect the PC to an Ethernet switch, an IP address is automatically allocated and you can establish the connection via test.commander.

**Tip**

We recommend the use of industrial Ethernet switches. The Q.station 101 uses autonegotiation and operates, if available, with 1000 Mbit/s and full duplex for the transmission.

## 5.2 Connect Q.station to an Ethernet interface

If you are not connected to a network or if no server is located in the network, you have the following options:

1. You use a fixed address from the range 192.168.1.x for your PC. In principle with a network you can also establish a connection when the network uses a different address range. But it is better in these cases to establish a direct link initially and then to allocate an address to the Q.station 101 from the address range of your network.

   If the Test Controller does not receive an IP address from a server, then it adjusts to its static IP address after a few seconds. The factory setting of the static IP address is 192.168.1.28. Therefore, set your PC, for example, to 192.168.1.10.

2. You use one of the versions Q.station 101 D or Q.station 101 DT and change the address of the Q.station 101.
   Tap on the tile and and enter an IP address from the address range of your PC in the following screen.

With the versions Q.station 101 D and Q.station 101 DT the IP address used (and whether DHCP is used or not) is shown in the display.


*Fig. 5-1 Indication of the IP address in the display.*

**Tip**
Refer also to Section 5.7, *Ethernet on the PC*, on page 35 for the display and setting of the PC IP address.

## 5.3 Establishing a connection

A project is created by the test.commander in the course of establishing a connection. A project contains the hardware setup, the sensor and I/O settings present in the modules as well as the sensor signals used and computations, the so-called variables, which are to be output. You load this project later to be able to carry out settings.

**Procedure**

1. Make sure that the current version of the test.commander software 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 5.6 on page 34.
2. Start the software and select **Open Wizard to start ...**
   Another program window opens.
3. Enter a name for the project.
4. Select the network adapter to which the Test Controller is connected.
5. Specify which network type you are using.
   a) ***A DHCP server is available in the network used***. For a new Test Controller activate ***DHCP is activated***.

b) ***The controller will be connected to a network without DHCP server*** or ***The controller will be directly connected to the PC***.

6. Make sure that the Ethernet interface of the Test Controller is connected and the power supply is only switched on after connection to the network or PC. Then click on ***Continue***.

➡ If this is the first connection which you are establishing, you must obtain access to the network for the test.commander (requires administrator rights).

7. Wait until your Q.station 101 Test Controller is displayed. Mark the entry and click on ***Continue***.

   If the Test Controller is not shown, check the IP address in the display (if available). Otherwise check whether the server has allocated an address to the module. Also check whether the network cable is correctly inserted and, if necessary, whether the port on the switch is active. Then carry out a scan again.

8. If you are not using a network with DHCP server, you obtain a dialog with the possibility of allocating a fixed IP address to the controller. Then enter an IP address from the range of your network or PC.

9. Connect your modules to the UART(s) of the Q.station 101 Test Controller, switch on the power supply for the modules and wait until the modules have initialized (blue LEDs flash briefly every two seconds). Then click on ***Continue***.

   All interfaces are searched for modules. If there are address conflicts, the addresses are changed appropriately, provided this is possible via the PC (no hardware addresses via the DIP switch in the base).

10. Read the configuration out again, check the variables (names) and, if necessary, make corrections and open the assistant with a click on ***Continue***.

Finally, a window is shown in which the Test Controller and all modules with the values of the measuring channels can be seen (provided they are configured and capable of measurement in the standard configuration).

Once you have seen the procedure, you can also carry out all the settings yourself for further projects, i.e. create a new (blank) project and then add your Controller Online, etc.

## 5.4 Note on the connection of modules

### 5.4.1 Activating the terminating resistances

The terminating resistances must be activated on the *last* base of each interface line (and only there), because the end of the line

must be terminated with two resistors (termination). Otherwise reflections occur on the line and lead to disturbances, even to the loss of data transmission.

**IMPORTANT**
The terminating resistances may only be activated at the end points of the interface line. If resistances are also activated in between, the signal is weakened and interference or even interruption of the data transmission occurs for the modules located after the additional resistances.
Separate termination on the Q.station 101 is not necessary.

➡ 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.

The cable diameter, which can be connected to the terminals, is 0.14 $mm^2$ minimum and 1.5 $mm^2$ maximum or with wire-end sleeves without plastic sleeves 0.25 $mm^2$ and 1.5 $mm^2$ and with plastic sleeves between 0.25 $mm^2$ and 0.5 $mm^2$. In total no more than 16 modules should be supplied through their bases connected together. With more modules another supply line is necessary, for example via the Q.bloxx Extension Socket QES.

➡ The extension socket only supplies the module situated to the right of it and the modules located to the left of it require a power supply via the socket located on the far left.

### 5.4.2 Connecting modules to Q.station 101

The Q.station Test Controller is inserted directly onto a mounting rail (35 mm DIN rail according to DIN EN 60715) and connected to the bases via cables and plugs. If you want to exploit the maximum number of 64 modules, you must connect each of all four serial interfaces (UARTs) of the Q.station 101 to 16 modules. The sync lines are not needed for this and the synchronization takes place through the UART lines. In doing this, pay attention to the maximum line length of the individual interface cables; refer to the table on Section 6.1.2.1, page 44.

**Pin assignment of Q.station 101 UARTs**

| | |
|---|---|
| UART 1 B (B1)<br>UART 1 A (A1) | Max. 16 modules |
| UART 2 B (B2)<br>UART 2 A (A2) | Max. 16 modules |
| UART 3 B (B3)<br>UART 3 A (A3) | Max. 16 modules |
| UART 4 B (B4)<br>UART 4 A (A4) | Max. 16 modules |
| Sync B (SyB)<br>Sync A (SyA) | Input/output for synchronization with another Test Controller |

*Fig. 5-2 Terminal assignment of the plug-in terminal for the UARTs of the Q.station 101 Test Controller; refer to Fig. 4-2 on page 17 for the position of the connector strip.*

➡ If you want to use all four interfaces, then in each case with all four groups you must use the connection for UART 1 on the socket or insert the Q.bloxx Extension Socket QES to be able to use the interface lines for UART 2 available on the sockets.

## 5.5 Synchronization of several systems

The synchronization of several interconnected Q.series modules is ensured by the Test Controller Q.station 101. Here, you can also interconnect the Q.station with other types of test controller, e.g. with Q.pac. With Q.gate the connection is possible optionally.

All synchronized modules operate synchronously and the maximum jitter is approx. ±0.5µs over all modules. The synchronization line transfers not just a clock signal, but also the date and time.

In each case connect SyA with SyA (SyncA) of the next module, SyB with SyB (SyncB) of the next module, etc.

You have various methods of obtaining synchronization, even with several *systems*, i.e. several Test Controllers; (refer also to Fig. 5-3 on page 31):

1. Use the time signal in the Q.station 101 Test Controllers based on the IRIG standard (Inter Range Instrumentation Group) to synchronize all other Test Controllers to one master controller.

The master controller (the device which is *not* configured as a slave, refer to Section 6.1.1.3, *Synchronization*, page 44) uses its internal clock for the date/time stamp (gray path in Fig. 5-3). For this type of synchronization (inputs SyA and SyB) you must lay synchronization lines between the Test Controllers; the maximum length of all lines together is 400 m. The master controller transfers the time stamp through an RS-485 link to the other Test Controllers. This method achieves the best time synchronization with the smallest jitter (approx. ±2 µs) between the individual modules, because the time information passes simultaneously to all Test Controllers.

2. You connect a radio receiver for time signals, e.g. for DCF77 which converts the received time signal to IRIG-B or AFNOR NF S87-500, to a Q.station Test Controller.

   As master controller this then synchronizes all other Test Controllers using IRIG (orange colored path in Fig. 5-3) as with Variant 1. If it is not possible to connect the individual Test Controllers via synchronization lines or this is not desired, you can also connect a receiver to each Test Controller (Variant 2b).

3. You connect an NMEA-0183 compatible GPS receiver (Global Positioning System) to a Q.station Test Controller, which then, similar to Variant 1, synchronizes as master controller all other Test Controllers (from firmware V1.08).

   With this method the time information of the GPS signal is evaluated instead of a pure time signal. In addition you can also process the position details of the GPS receiver in the system and assign the measurements (light blue path in Fig. 5-3). If it is not possible to connect the individual Test Controllers via synchronization lines or this is not desired, you can also connect a receiver to each Test Controller (also to a Q.gate Test Controller) (Variant 3b).

4. You define a PC as an SNTP time server which can distribute the NTP time stamp to all Q.station, Q.gate or Q.pac Test Controllers (dark blue path in Fig. 5-3).

5. You use EtherCAT for the synchronization of the Test Controller (distributed clock).

**IMPORTANT**

The maximum length of the synchronization cables on SyA and SyB is 400 m.

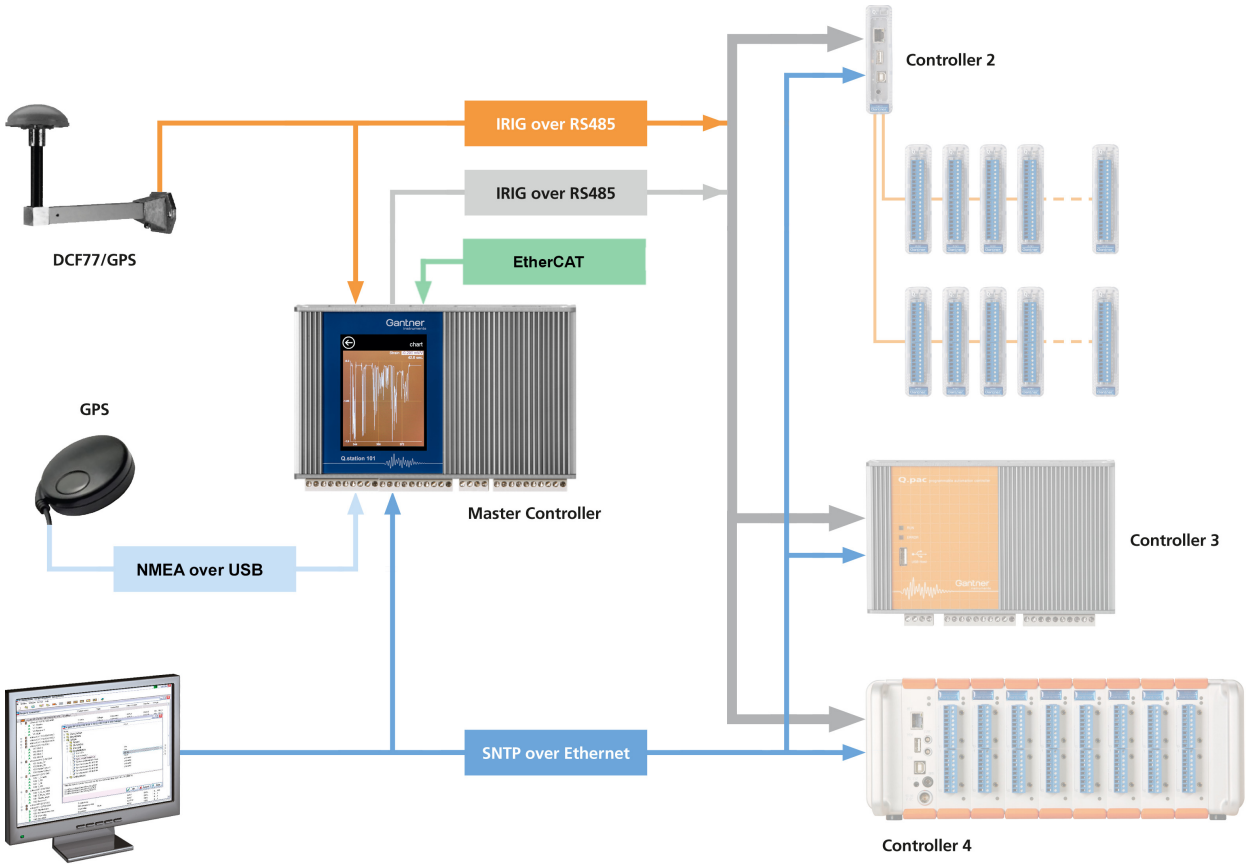



*Fig. 5-3 Possible types of time synchronization.*

The absolute accuracy of the time information depends on the method used. If you do not want to use or cannot use any time synchronization lines, e.g. because the spacing of the systems is too large, you must expect greater deviations. In the variant 2b the deviations lie in the range from a few milliseconds up to about 100 milliseconds, but this depends on various factors, e.g. how often the time information is received. In the variant 3b the time accuracy of the GPS signal is decisive, which is only approx. 1 second absolute.

The fourth method uses, for example, the SNTP protocol (Simple Network Time Protocol) used in the Microsoft Windows operating system to transfer the date and time via Ethernet. However, the individual Test Controllers must always query the time server in order to be able to synchronize their times to the time server. The achievable accuracy is therefore not as good as for the first three methods. If required, you can also set up a (full) NTP time server on a PC and synchronize it with a time server in the Internet. You will find further information about this at http://www.meinberg.de (here you can also download a time server program) and at http://www.pool.ntp.org. The time accuracy is then only dependent on the change in the response times in your network.

The fifth method receives the time signal from a EtherCAT master. Here, the time delay of the signal is fed back to the master (from firmware version 1.7.2) which then calculates a new time signal. The time resolution of the signal is 1 µs. The start date of this time calculation is 1.1.2000.

If you combine several synchronization methods, the best possible one is always used from those available:

1. Hardware synchronization (synchronization of the Q.series, EtherCAT, IRIG-B or AFNOR using a time signal, e.g. DCF77)
2. Time signal from GPS (NMEA-0183)
3. SNTP

The configuration of the synchronization in all cases occurs via the test.commander program. Apart from synchronization via SNTP (Section 6.1.3.5, page 50) you set the type of synchronization used via the menu **Settings > Synchronization**; refer to Section 6.1.1.3, page 44.

### 5.5.1 Connection of a radio receiver for time signals

The Q.station 101 can process the following time signals:

- AFNOR NF S87-500
- IRIG B003
- IRIG B005

Depending on the output signal of your receiver you basically have the following methods:

1. The receiver, e.g. for DCF77, is connected to the digital IOs of the Q.station 101 Test Controller (plug-in terminal Digital Input, connections DI1 and GND; refer to Section 4.2, page 17f). The variant is suitable if the receiver outputs signals at a TTL level. This is the case, for example, with Hopf clocks (IRIG-B003 or IRIG-B005 depending on type) with TTL output (e.g. module 4465 with interface version 5).
2. The receiver is connected through the sync input (plug-in terminal UART, connections SyA and SyB; refer to Section 4.2, page 17f). The variant is only possible when the receiver has an RS-485 interface, because the sync input uses this interface.

With **Settings > Synchronization**, specify which variant you are using; refer to Section 6.1.1.3, page 44.

### 5.5.2 Connection of a GPS receiver

NMEA-compatible or Garmin GPS receivers can be connected to the Q.station 101 Test Controller via the USB interface. If your

device only has one RS-232 interface, you can use a commercially available RS-232-to-USB adapter.

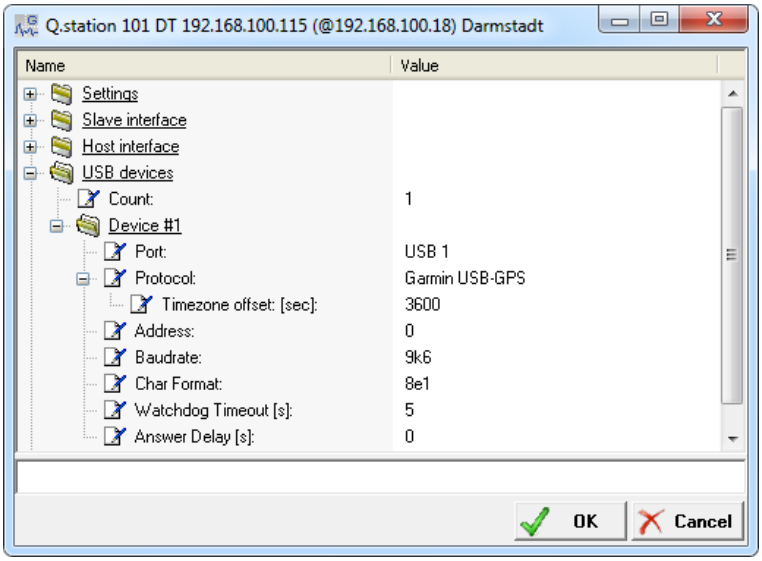



*Fig. 5-4 Settings for a GPS receiver from Garmin*

Here, define the interface settings (for the connection refer also to Fig. 4-1 on page 17). If no new time information is received within the time period specified for the communication monitoring, the Q.station 101 uses the next available synchronization method.

**Evaluation of position data**

Use the variable *GetPositioningData* to evaluate the individual data items of your GPS receiver; refer to Fig. 5-5. You need one dedicated variable for each item of data supplied by your receiver. The various messages which contain the relevant value, e.g. GGA, are listed in the explanation of the command. You have to re-enter the port here, because several receivers may be connected.

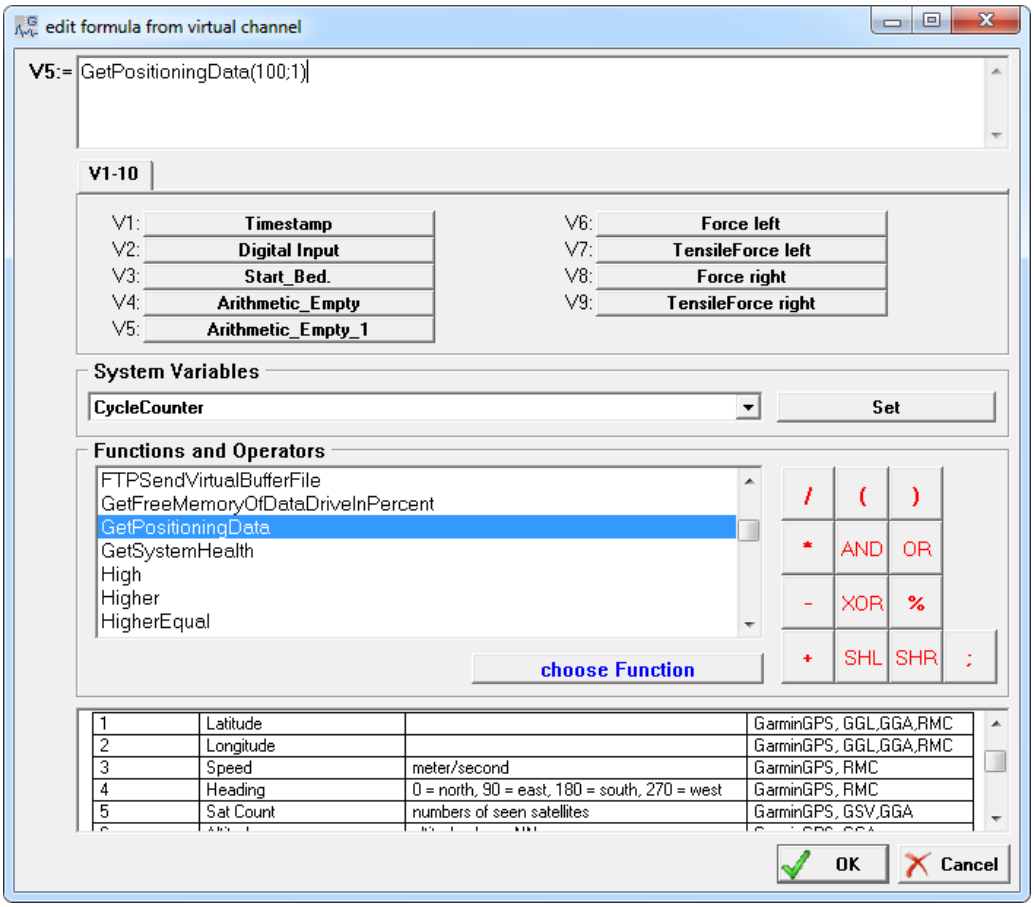



*Fig. 5-5 Output of the latitude (Parameter = 1) in a variable of the type ARITHMETIC_EMPTY; the GPS receiver is connected to USB1 (Parameter = 100; refer also to Fig. 5-4).*

## 5.6 Installing the test.commander

➡ We recommend that you close all open programs before the installation. Administrator rights are needed for 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 window. Alternatively, you can also start the program Setup.exe in the folder test.commander to carry out the installation directly.

➡ The program ICP 100 is installed together with the program test.commander.

You will also find the relevant latest versions of the programs on our home page 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 test.commander is started for the first time, you specify the language for the program user interface (you can change your selection at any time via **Extras > Settings > Language**).

For the program a license number is needed which you have to enter to be able to save configurations. You will find the license numbers in the PDF file enclosed with the supplied items and on the separate printout with your license data.

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.

## 5.7 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.

### 5.7.1 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. 5-6). In the following status dialog (similarly in Fig. 5-6) 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.

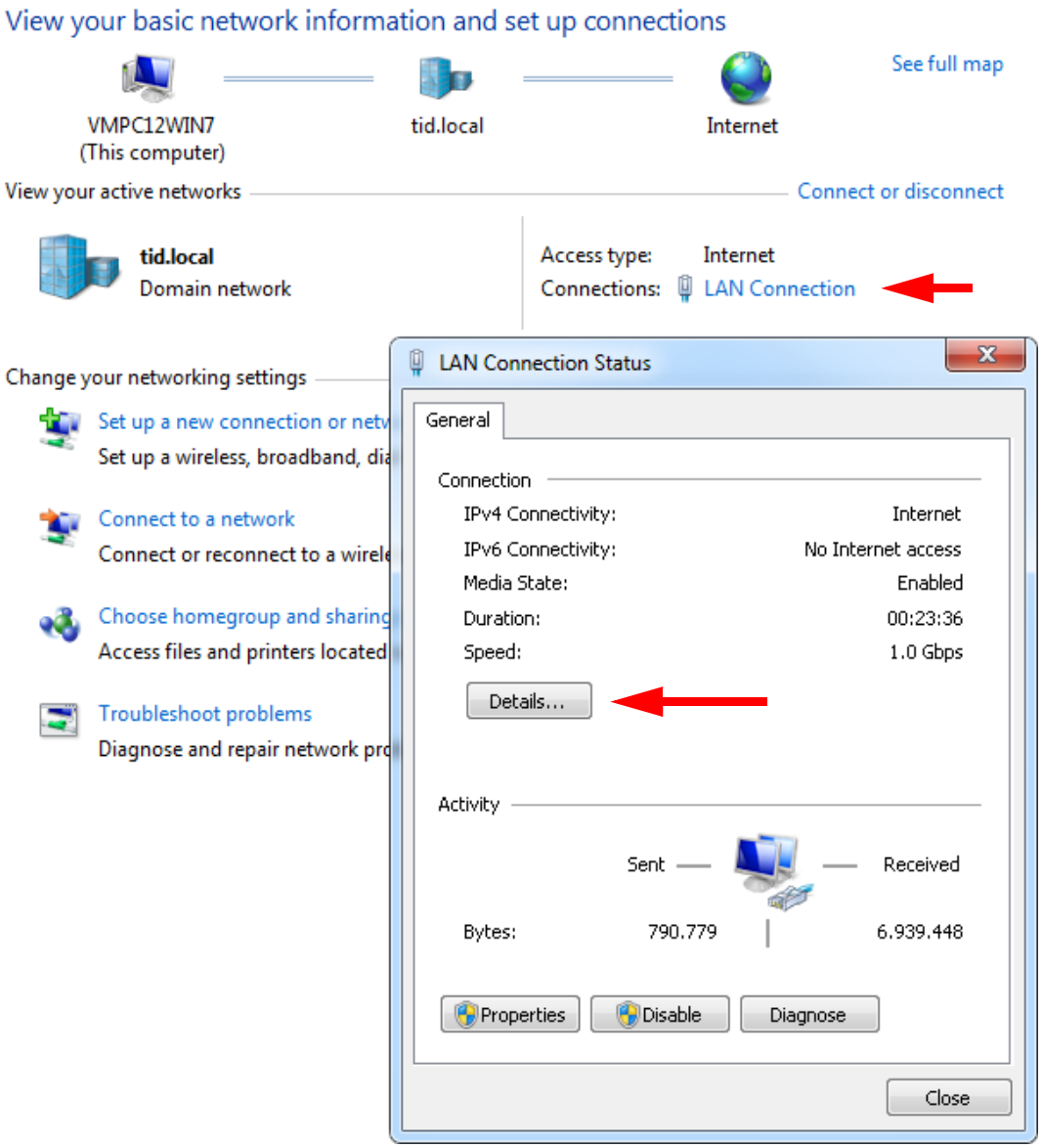



*Fig. 5-6 Viewing/changing the IP address of the PC*

**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.

### 5.7.2 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. 5-6 on page 36). 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. 5-7).

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. 5-8).

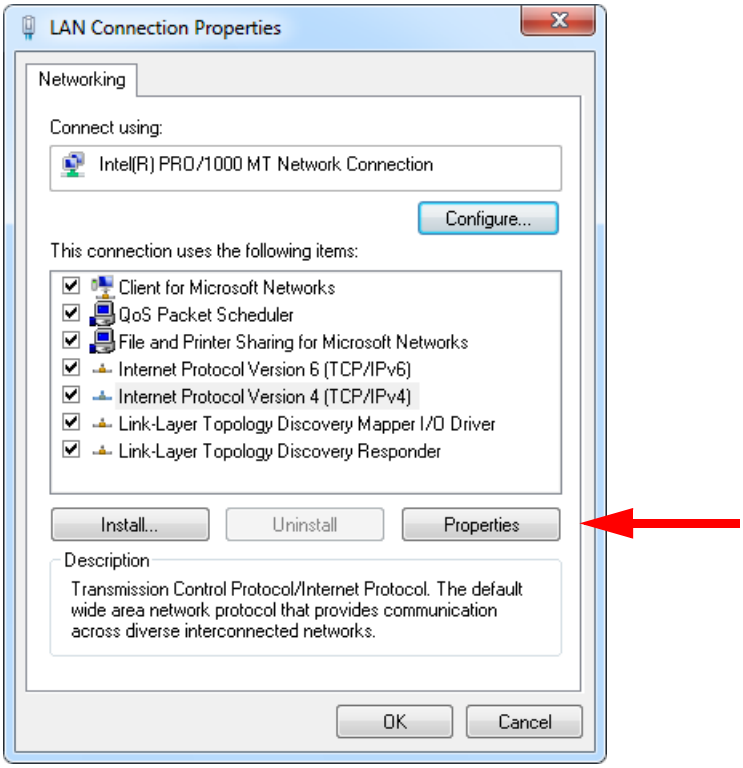



*Fig. 5-7 LAN connection properties (Windows 7 and 8).*

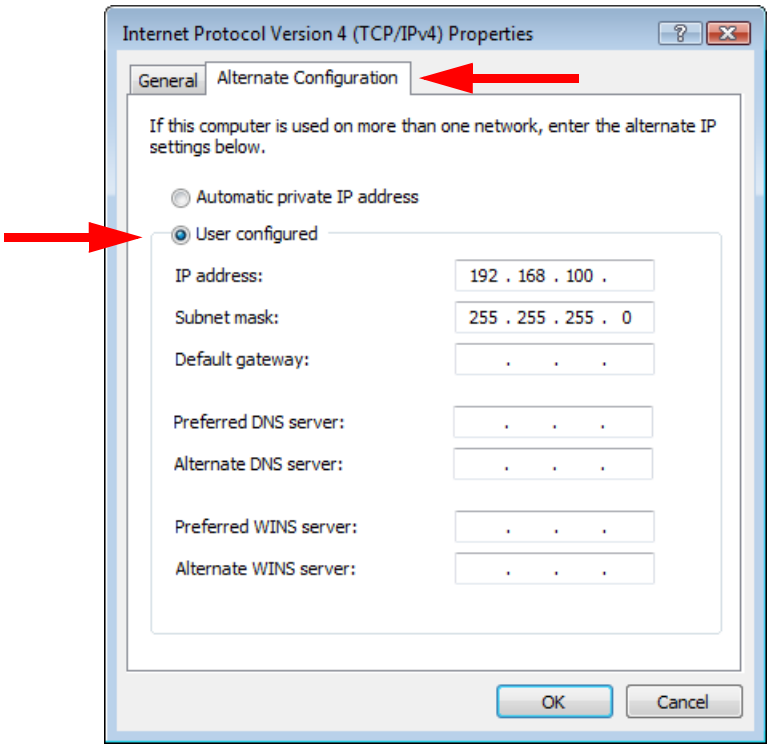



*Fig. 5-8 Specifying the IP address and subnet mask for an alternative (temporary) configuration.*

### 5.7.3 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. 5-9. Click on ***Allow access*** to allow the connection.

**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.

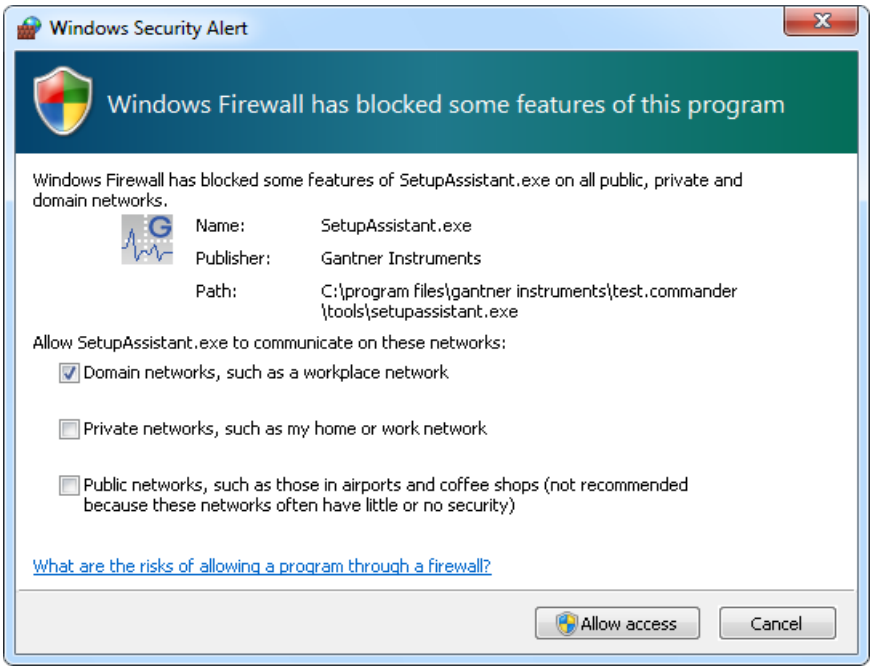



*Fig. 5-9 Firewall message from Windows 7 when attempting to connect through Ethernet; here for the Setup Assistant.*

# 6 Basic configuration of your system

You must first create a project and establish contact with the module before you can configure it. You will find a description of the working steps in Chapter 5, *Q.station 101 connection*, page 25.

The following chapter describes the most important settings to be able to measure with the Q.station.

**IMPORTANT**

If you would like to combine modules or Test Controllers from older applications and recently purchased ones, all components should use the latest relevant internal software, the so-called firmware. To ensure this, carry out a firmware update; refer to Section 6.6, page 64.

### Basic procedure

- Establish the connection (communication) between the PC and Test Controller; refer to Chapter 5, *Q.station 101 connection*, page 25.
- Start the configuration program.
- First, start with the basic configuration of the Test Controller and leave the definition of further settings, such as system variables or storage settings, to the end.
- Enter the sensors used and their sensitivities to obtain an indication in the measured physical quantity. Define computations, digital inputs/outputs, alarm monitoring, etc. These working steps are described in the manual for the Q.series modules.
- Specify which data are to be recorded and how; refer to Chapter 7, *Recording with the data logger*, page 67.
- Activate all settings in the modules and in the Test Controller.

**IMPORTANT**

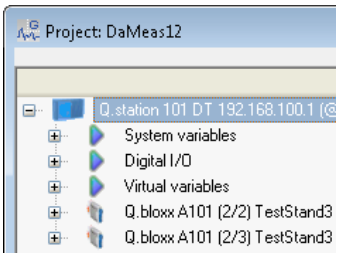
After changes to the configuration of modules or a Test Controller * is displayed in the project tree. Select  or **File > Write Project (Update)** in the test.commander to update the settings in the project (and in the Test Controller). The project file is automatically saved.

**Tip**

At many points in the software 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.
You process a complete variable in the configuration dialog in that you click on the variable in the left column (contains the variable number Vx) to mark it. Using the context menu, you can then cut, paste and copy the variable, overwrite it with a copied variable or delete it.

## 6.1 Q.station basic settings

In the Test Controller you specify, for example, the type and scope of the synchronization, set the (synchronous) output rate and baud rate of the modules to be used or define which bus diagnostic data or life signs are to be transmitted. In addition, you can check all the settings of host and module interfaces, allocate a location name, etc. The following sections deal with the most important settings; further settings are explained in separate chapters.




Mark the Test Controller to be set and select **Settings** from the context menu or double click on the Test Controller to start the configuration program.

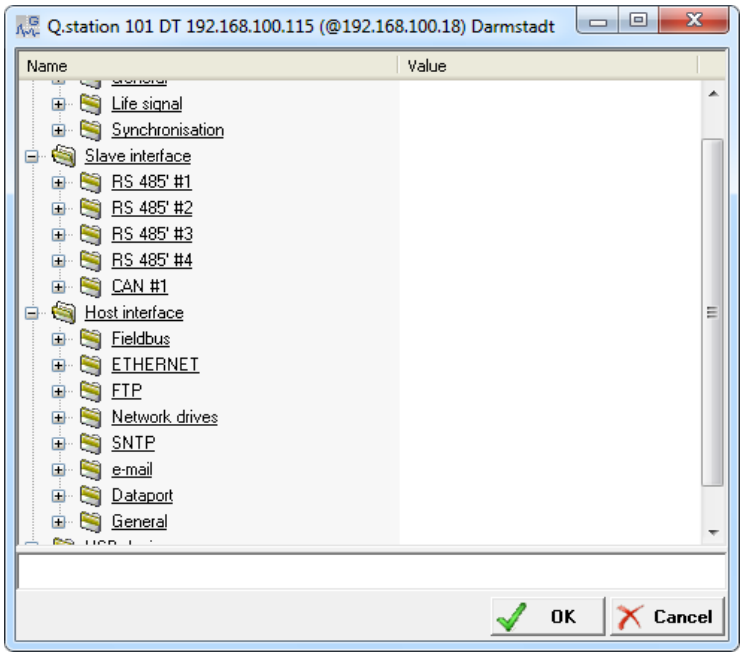



*Fig. 6-1 Configuration dialog for a Q.station 101 Test Controller (extract).*

Then you can carry out all the module settings in the window of this dialog. A tree structure similar to that in Windows Explorer

shows the individual parameter groups. Open up the entries as required by a click on ⊞.

### 6.1.1 Settings

Using this parameter group you define, for example, life signs or the location name.

#### 6.1.1.1 General remarks

**Location**

Here you allocate a name for the Test Controller, e.g. the location. The default setting is ***Undef***.

**PAC functionality**

The PAC functionality offers the possibility of autonomously implementing (independent of the PC) any functions of many measurement quantities and I/Os, calculations, logical operations, time and transfer elements, etc. with the graphical software test.con.

Here, you activate or deactivate the general data access to Q.station variables (read and write) of the test.con applications from real-time and user space. The default setting is ***Activated***.

**Buffer pre-initialization**

In the ***Fast fill*** default setting each measurement transferred with a bit error leads to an error: the measurement is set to -1 (default setting for ***Fill pattern***) and the error counter is set. This generally causes the test-rig to stop. In the setting ***Deactivated*** the previous measurement is also used for the present measurement. If the next measurement is alright again, measurement continues as normal. The error is however counted, but no alarm is triggered. In the ***Slow fill*** setting the process is the same for two seconds as in the ***Deactivated*** setting, thereafter as in the ***Fast fill*** setting. In this way brief disturbances are ignored.

**Filling pattern**

Value which is used for a defective measurement (refer to Buffer pre-initialization).

**Switching threshold of the digital inputs**

Here, you select whether the TTL level (5 V) or the PLC level (24 V) is used for the digital inputs. With TTL the switching thresholds are <1V and >3.5V and the PLC levels are <7V and >8V. Refer also to Section 4.2, page 17.

**System cycle frequency**

The system cycle frequency provides the (internal) clock for the processing of virtual variables and test.con applications in the Q.station. The cycle frequency can be set slower or equal to the highest sample rate. The maximum cycle frequency is 10 kHz; it determines the system load.

#### 6.1.1.2 Life signal

Here you specify how the life-sign signal (Live signal) is to be produced. You can output a static signal which only changes its status when an error occurs or you can use a dynamic signal which changes its status between high and low with a certain frequency. You enter the frequency or the half-cycle time under I/O status change time in seconds. Choose the conditions for which an error is to be signaled.
Refer also to Section 4.2, page 17.

**IMPORTANT**
The conditions change (note text) when you switch over from ***Static*** to ***Dynamic***, because logical operations with AND or OR are carried out depending on the type of signal.

#### 6.1.1.3 Synchronization

In the menu **Input synchronization protocol** you set both the type of synchronization used and also the inputs used for it.

If your device is operated as a slave, i.e. if you connect another Test Controller which has the time information available to SyA and SyB or you connect a radio receiver for time signals with an RS-485 output to these connections, specify ***Q.sync via RS-485***.

**IMPORTANT**
The maximum length of the synchronization cables on SyA and SyB is 400 m.

Specifying ***EtherCAT DC Time*** (distributed clock) is only practicable when an EtherCAT master is present.

In the setting ***None*** the Test Controller operates with the internal time (as master for other connected Test Controllers).

If you want to synchronize via SNTP, you have to specify the time server using **Host interface > SNTP**; refer to Section 6.1.3.5, page 50.

### 6.1.2 Module interface

Using this parameter group you specify the speed of the data transmission on the individual interfaces (UARTs). Also, the baud rate for the CAN bus interface is set here.

#### 6.1.2.1 UART interfaces (RS-485 #1 to #4)

Select the required baud rate (transmission speed).

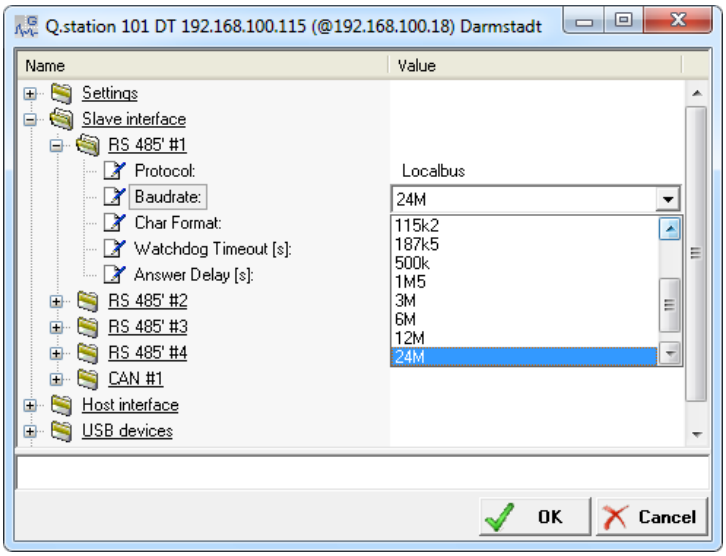



*Fig. 6-2 Baud rate selection.*

The maximum possible speed depends on the overall length and quality of the cable which is connected to the relevant interface. When using high quality cable, the maximum achievable distances are:

| Cable length in meters | Maximum baud rate |
|---|---|
| 1000 | <500kBd |
| 100 | <1500kBd |
| 20 | <6000kBd |
| 10 | >6 to 24MBd |

Note that depending on the quality of the cable used (capacitance per unit length, loop impedance and characteristic impedance) the achievable distances may be substantially shorter. In all cases make sure that the terminating resistances are activated (Section 5.4.1, page 27).

➡ A change in the baud rate is also carried out automatically on the modules connected to the interface.

**Communication monitoring**

With a value > 0 the module error LED is activated if there is a lack of communication after this period.

**Response delay**

This parameter is only needed when the modules are not directly connected to this interface, but instead connected to a modem, for example. Then enter the time here which is to be awaited additionally due to the slow connection.

#### 6.1.2.2 CAN bus interface

You can both read and send data over this interface. The maximum possible speed depends on the overall length of the cable which is connected to the relevant interface.

| Cable length in meters | Maximum baud rate |
|---|---|
| 1000 | <50kBd |
| 100 | <500kBd |
| 50 | <800kBd |
| 25 | <1MBd |

**IMPORTANT**
A change in the baud rate only affects the Q.station; connected CAN devices must be set to the selected baud rate separately.

**Communication monitoring**

With a value > 0 the module error LED is activated if there is a lack of communication after this period.

**Response delay**

With this parameter you can specify an addition time-out period which is allowed to pass before communication monitoring signals an error.

### 6.1.3 Host interface

This parameter group defines the settings for the communication over the interfaces EtherCAT, Modbus, Ethernet, FTP and Dataport and it enables you to implement access protection for the Q.station.

Here you also have the possibility of specifying e-mail settings for messages from a data logger and of defining network drives which the Q.station 101 Test Controller can access for data storage. This means that a data logger can also save to a network drive and not just to a local drive.

#### 6.1.3.1 Field bus (EtherCAT)

The section contains the settings for the EtherCAT interface. Deactivate the interface if you do not need it.

**IMPORTANT**
Using the context menu of the Test Controller and **Assign Read/Write Access Sources**, define which variables are to be available on the field bus. Activate the read access (***READ permissions***) in the **Fieldbus** column for the relevant variable (Fig. 6-3).

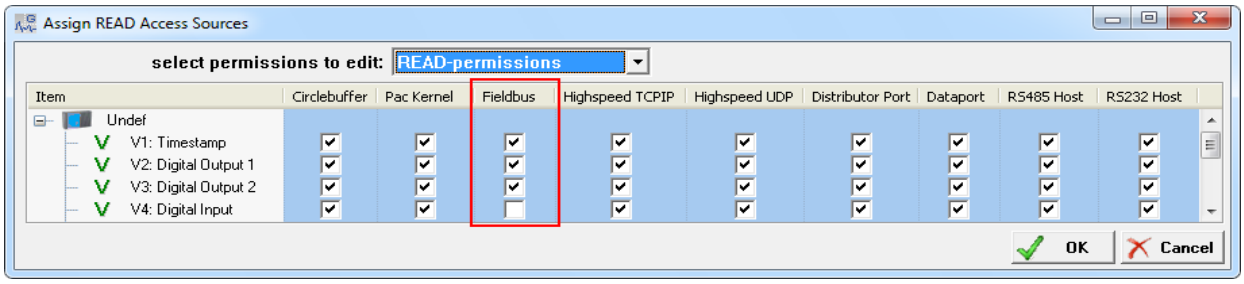



*Fig. 6-3 Enable read access for the field bus.*

**Communication monitoring**

With a value > 0 and with a lack of communication after this period the error status becomes active; refer to Section 4.4.1.3, page 21.

**Frequency divider**

This value determines the transfer rate for the EtherCAT interface. The divider is required at high data rates to avoid overloading the interface. The value refers to the sample rate #1 and reduces, where applicable, the data rate on the EtherCAT interface. With a setting of 4 and a sample rate #1 of 4000 Hz the transfer rate is 1000 Hz (Fig. 6-4).

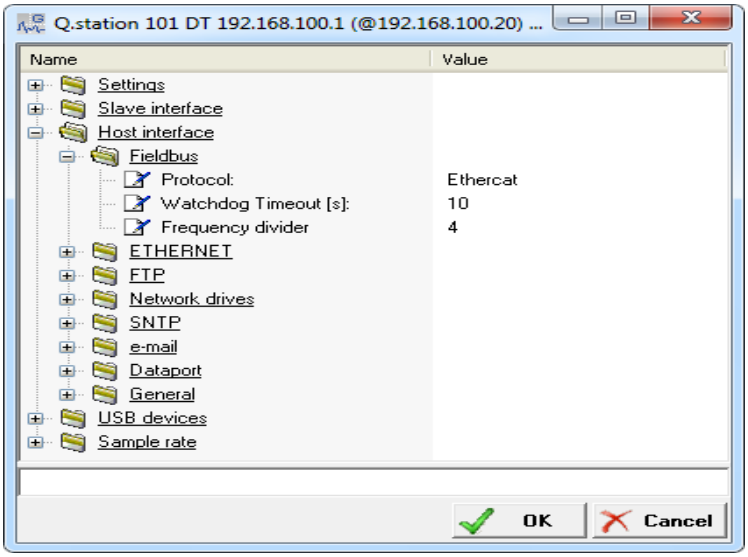



*Fig. 6-4 Setting for the frequency divider.*

### 6.1.3.2 Ethernet

Use this section to assign a fixed IP address to the Q.station or to set it to DHCP again if you are using the version Q.station 101 or Q.station 101 T (without display).

➡ The stated static IP address is only effective when *no* DHCP server is being used.

The IP address used in the setting **Use DHCP server: *Yes*** can be found under **General remarks**; refer to Section 6.1.3.8, page 51.

### 6.1.3.3 FTP

**Server settings**

With the function **Server settings > Use permission names** you can implement access control (password protection).

**IMPORTANT**
You can work completely without any (**Use permission names: *No***) or with *all three* passwords.

Note down the passwords and keep them in a safe place. If you have forgotten a password, note down the serial number of your Test Controller and contact us: office@gantner-instruments.com
You then receive a release code which resets all three passwords.

**Client settings**

Here you define an FTP server with which the Q.station can connect as client. You can then specify for a logger that the created files are sent directly to the FTP server.

**IMPORTANT**
You have to set up an FTP server appropriately on a PC. There are many programs which facilitate this, e.g. FileZilla.

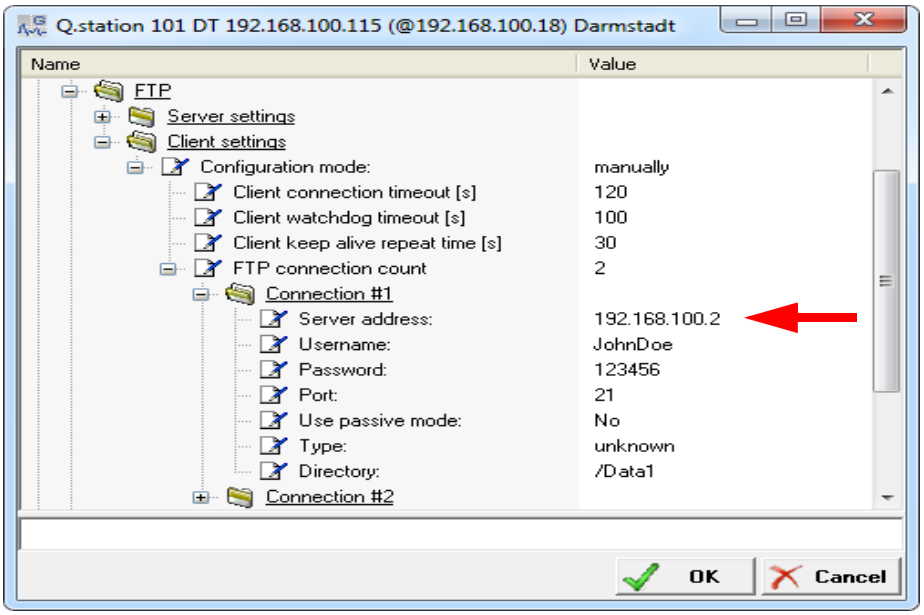



*Fig. 6-5 Details about the FTP server so that the Q.station can access it as a client.*

Check whether the settings for your FTP server at ***Client connection timeout***, ***Client watchdog timeout*** or ***Client keep alive repeat time*** have to be changed. Then specify how many (maximum ten) FTP servers you would like to set up. The

FTP servers can also only differ due to the directories. The directory specified at ***Directory*** is created as a subdirectory to the directory released in the FTP server.

**Use passive mode**

With a passive FTP the client sends a special command which causes the server to open a port and to send the port and IP address to the client. The client uses a port via 1023 and the port just transmitted by the server. This technique is necessary when the server itself is not capable of establishing a connection to the client, when the client is located behind a router or when a firewall screens the client from external access.

**Type**

Since the FTP server can be set up on any operating system, the client needs information about the form of the response to an interrogation of the directory. Unfortunately, this is not standardized and, depending on the operating system, the file information is transmitted in various formats. Using this, the client can request the size of a file. Therefore, with the ***Unknown*** format only a check is made of whether a file with the name of the transmitted file exists. A check cannot be made of whether the file has the right size, i.e. whether all the data has been transmitted.

**Directory**

With this option you can define a subdirectory on the FTP server. If you would like to save the data from different loggers in different directories, simply create the same FTP server with different subdirectories, e.g. ***/Data1*** and ***/Data2***.

**IMPORTANT**
A differentiation is made between upper and lower case in the the directory path notation.

#### 6.1.3.4 Network drives

You can also use a network drive as the target memory for a logger, if you do not want to record on a storage medium on the Q.station 101 (SD card or USB). You provide the required details via this dialog (Fig. 6-6).

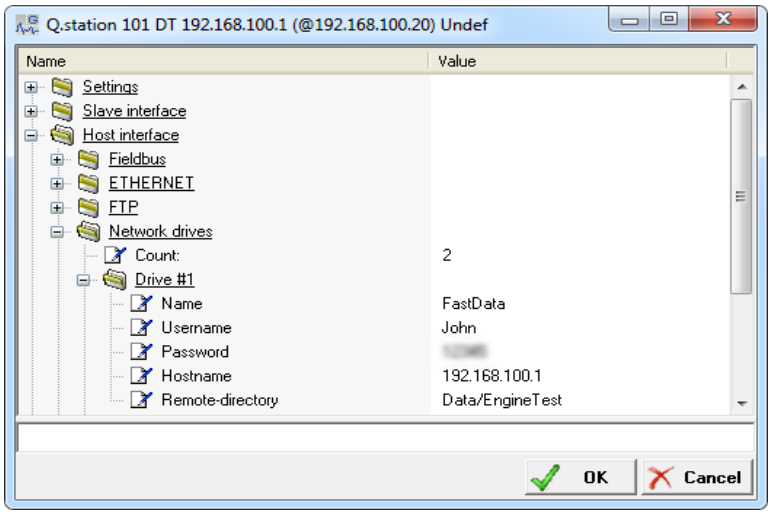



*Fig. 6-6 Specifying network drives.*

**Name** Here, enter the name which is to be used later in the logger for this target memory.

**User name** Here, enter the user name for which the target memory, i.e. the directory, is released.

**Password** Password for the user name.

**Host name** IP address or name (requires a DNS server) of the PC on which the directory is located.

**Remote folder** Here, enter the directory path, e.g. /Data/EngineTest. The path name corresponds to the directory path from the released folder.

Example: You have released the subfolder DataFiles in the folder Testing on drive D:. The directory path is then ***/DataFiles***, because this is the name of the release on the relevant PC (host name).

### 6.1.3.5 SNTP

Here, specify the IP address of the NTP server if you want to set up synchronization via NTP.
Refer also to Section 5.5, page 29.

### 6.1.3.6 E-mail

For a logger to be able to send e-mails you must here define the possible selections for the fields ***Address***, ***Subject*** and ***Body***.

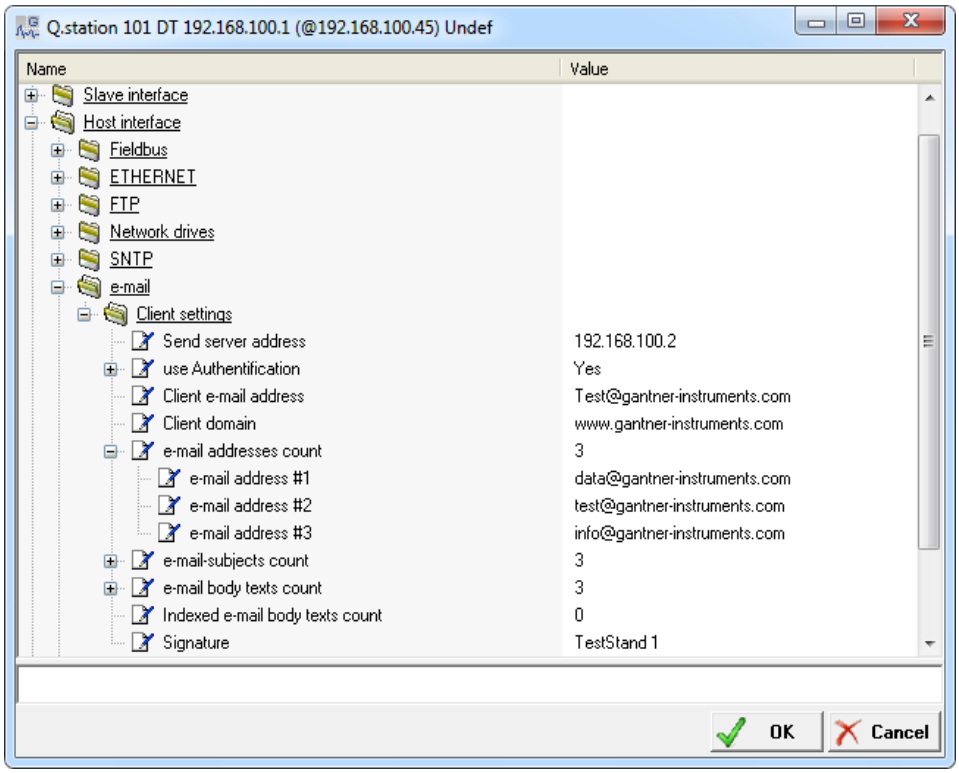



*Fig. 6-7 E-mail settings.*

In the dialog specify:

- To which server the mails are to be sent (***Send server address***),
- whether and if yes, how the authentication is to occur,
- how many e-mail addresses and how much information (subject, content) you need.

You can specify up to ten different addresses, subject lines and content texts. You can state, for example, the location or test rig of the Test Controller in a ***Signature***; the text is then always appended to the end of the mail.

#### 6.1.3.7 Dataport

This section contains the settings for Modbus if this is being used via TCP/IP (Modbus/TCP).

#### 6.1.3.8 General remarks (own IP address)

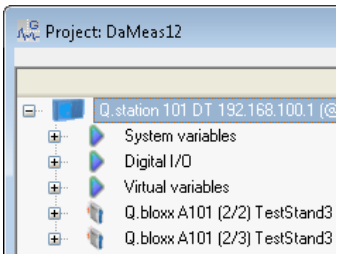
In the DHCP setting this shows the current IP address.

### 6.1.4 Sample rate and logger settings

With the Q.station 101 you can set up to four sample rates and data stores. On the data logger you define which data are saved, how often and where. The settings are written in a chapter of

their own; refer to Chapter 7, *Recording with the data logger*, page 67.

## 6.2 System variable




Below the basic settings for the Q.station there are also two entries for defining variables.

**IMPORTANT**

The variable ***Timestamp*** created in the default setting (DC system time, i.e. date and time since 1.1.2000) must not be deleted. You can however rename the variable. The time format has a resolution in µs.

In the System Variables section specify further time variables if you would like to use time formats other than in the default system time. Context menu for system variables **Add Variable > ABSDATETIME**. After a double click on the variable and a further click on ***Formula*** you can then select other formats (Fig. 6-8).

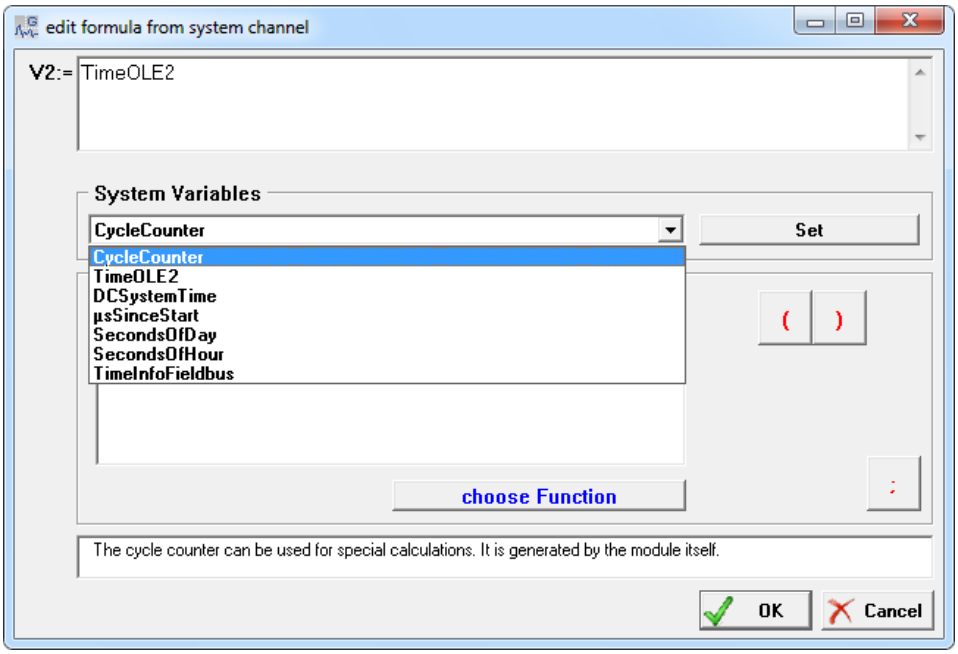
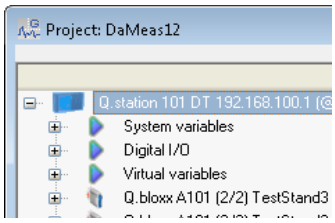



*Fig. 6-8 Dialog for specifying the time format.*

In the System variables section (or in the Virtual variables section) you can also define time variables, e.g. if actions are to be carried out at a certain time of day or hourly: Context menu **Add Variable > ARITHMETIC_EMPTY**. Then click on ***Formula*** to select a function.

## 6.3 Specifying digital inputs/outputs




In this section you produce the variables for your digital inputs and outputs. You can also combine several inputs or outputs to form a status field and use two inputs for an up/down counter or a rotated-angle signal with direction detection. PWM or frequency measurements are also possible.

### 6.3.1 Digital inputs

In the context menu for Digital I/O select **Add Variable > DIGITAL_INPUT**. You can also import existing variable definitions (**Add variable > Open Directory in Explorer**).

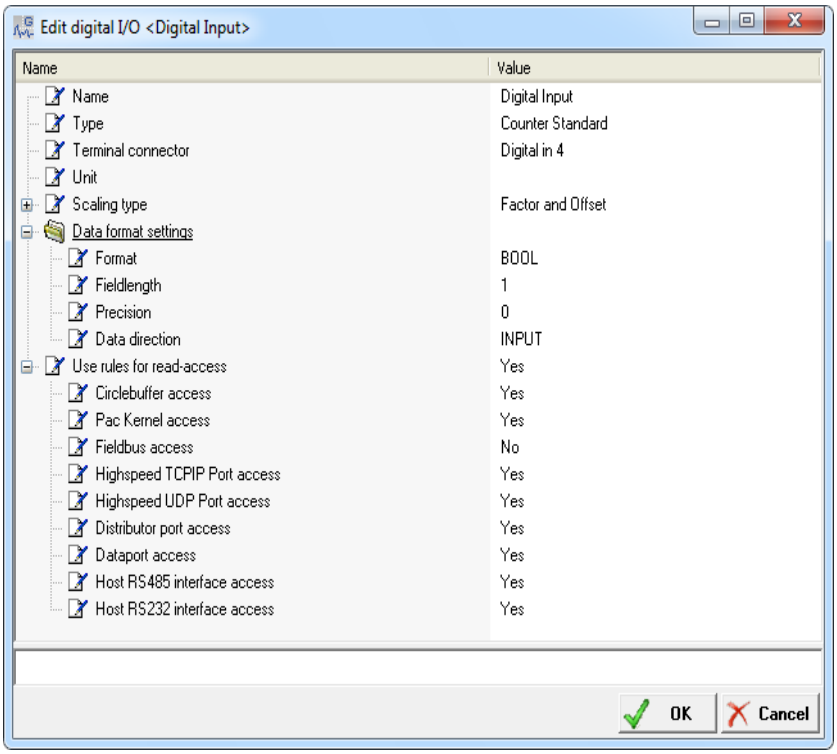



*Fig. 6-9 Configuration dialog for a digital input.*

#### 6.3.1.1 Type of input

The setting determines how the input is used and which further settings you must carry out.

1. Status

   With this function it is only necessary to specify the connection terminal. You can leave all other settings on the default setting, because here only the high or low level is evaluated.

2. Frequency

   You can choose between a simple frequency measurement (***Frequency, Standard***) and ***Frequency, 2-Wire***. The latter

enables you to detect the direction of rotation through the sign of the frequency (rotational speed) using two digital inputs.

The setting cannot be currently configured interactively. If required, please contact our Support.

3. Counter

   Here, you can choose between a simple counter (***Counter, Standard***), a forwards/reverse counter with two signals offset by 90° (***Counter, Quadrature 2-Wire***), a forwards/reverse counter with a static direction signal for forwards/reverse (***Counter, Up/Down***) and a forwards/reverse counter with two 90° offset signals plus index signal (***Counter, Quadrature 4-Wire***), i.e. a reference signal at a zero position.

   The setting cannot be currently configured interactively. If required, please contact our Support.

4. Pulse duration

   ***Pulse Length, Cycle*** measures the time between the low-to-high edges of a signal. ***Pulse Length, Active*** measures the time at the high level, ***Pulse Length, Passive*** measures the time at the low level. With ***Pulse Length, PWM Duty Cycle*** the ratio between the time period at high level to the time period at low level is evaluated.

   If required, you can specify a conversion factor between the pulse duration or the duty cycle of the input signal and the displayed value using **Scaling type**. Set the **Data format**, e.g. to ***SINT32*** (signed integer, 32 bit), **Field length *8*** and **Decimal** (places) ***4*** (the decimal point also counts as a place).

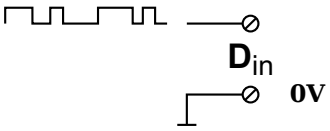
5. Status set

   With the Status set function you can combine several inputs to form a field. The inputs are evaluated as binary.

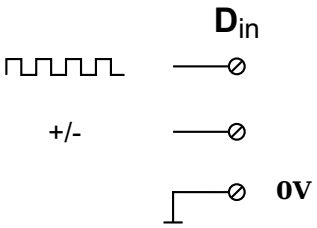
   The setting cannot be currently configured interactively. If required, please contact our Support.

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

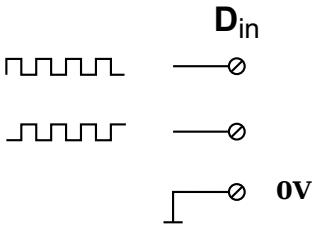
**Measurement of status, time, frequency or PWM (Pulse-Width Modulation), 1 signal**



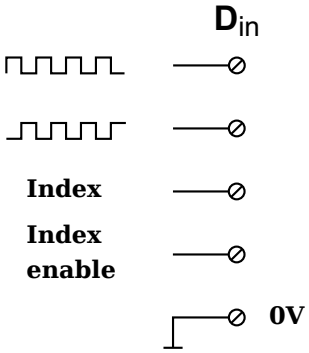
**Up/down counter or measurement of frequency and direction with static direction signal, 2 signals**




**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**




### 6.3.2 Digital outputs

With the digital outputs you have the choice between ***Status*** (single input, high or low) and ***Output set*** (several gated inputs). The input of a unit or of scaling information is only practicable with Status field.

➡ Note that DO1 is assigned with the live signal; refer to Digital outputs and power supply, page 19.

In the ***Status set*** setting DO2 is used for $2^2$, DO3 for $2^1$ and DO4 for $2^0$. However, you do not necessarily have to assign all these outputs as only those outputs assigned with ***Status set*** are controlled. The setting cannot be currently configured interactively. If required, please contact our Support.

**IMPORTANT**

Using the context menu of the Test Controller and **Assign Read/ Write Access Sources**, define which outputs are to be made available, e.g. for the field bus or the Test Controller (**Pac Kernel** column). Activate the write access (***WRITE permissions***) for the relevant output (Fig. 6-3).

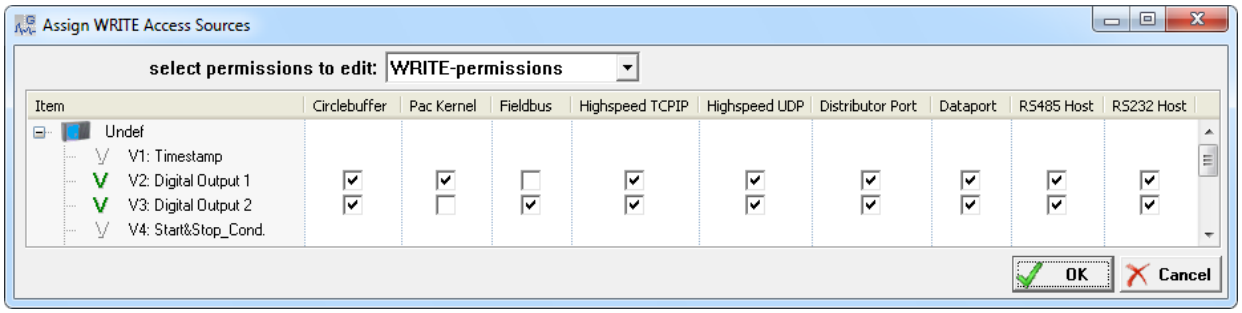
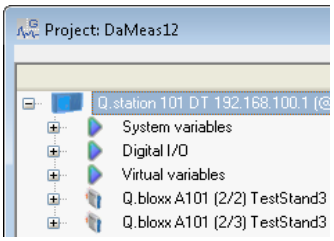



*Fig. 6-10 Enabling write access.*

## 6.4 Virtual variable




With virtual variables you can implement calculations, evaluate trigger conditions, carry out assessments or define CAN bus signals for input or output. The variables can be output like measurements or you can link them to other variables, measurements or digital I/Os. Virtual variables are also needed if you want to output computational results from a logger by Modbus/TCP. The maximum processing speed is 10 kHz.

**IMPORTANT**

After creating new variables select  or **File > Write Project (Update)** in the test.commander to transfer the new definition to the Test Controller. The project file is in this case automatically updated.

**Defining formulas and events**

In the context menu for virtual variables select **Add Variable > ARITHMETIC_EMPTY**. After a double click on the variable you can either specify a formula for the computation, define an event which is to be monitored (trigger) or specify the data format to be used (Fig. 6-11).

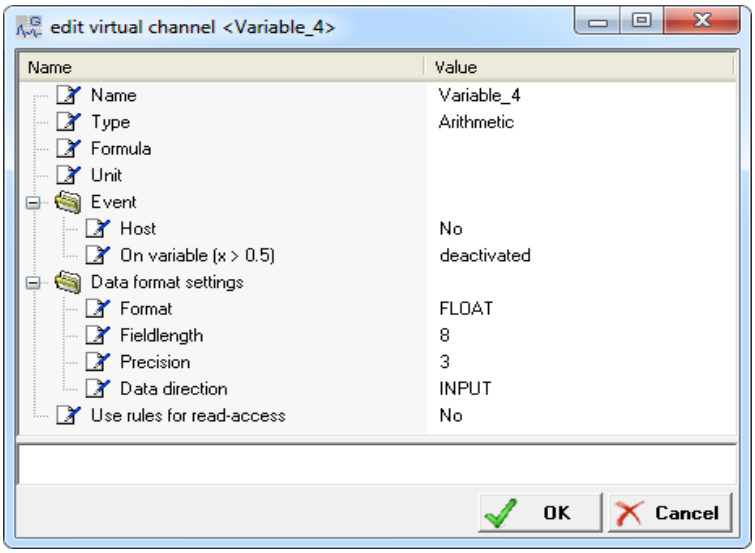



*Fig. 6-11 Configuration dialog for a virtual variable.*

Click on, for example, ***Formula*** to enter a computation (Fig. 6-12).

In the dialog you have available all variables already defined (tab **V1-10** and other tabs if more than ten variables have been defined). Click on one of the variables to insert it into the formula. Use the field **Functions and Operators** to select a mathematical or logical function (select the function and click on ***Choose Function*** so that it is accepted into the formula field). Where required add brackets (simply enter them via the keyboard) in order to obtain the correct computational sequence. The syntax of the selected function is explained in the lower section of the window. If required, zoom on this section to be able to read the text easier.

Close the dialog with ***OK***.

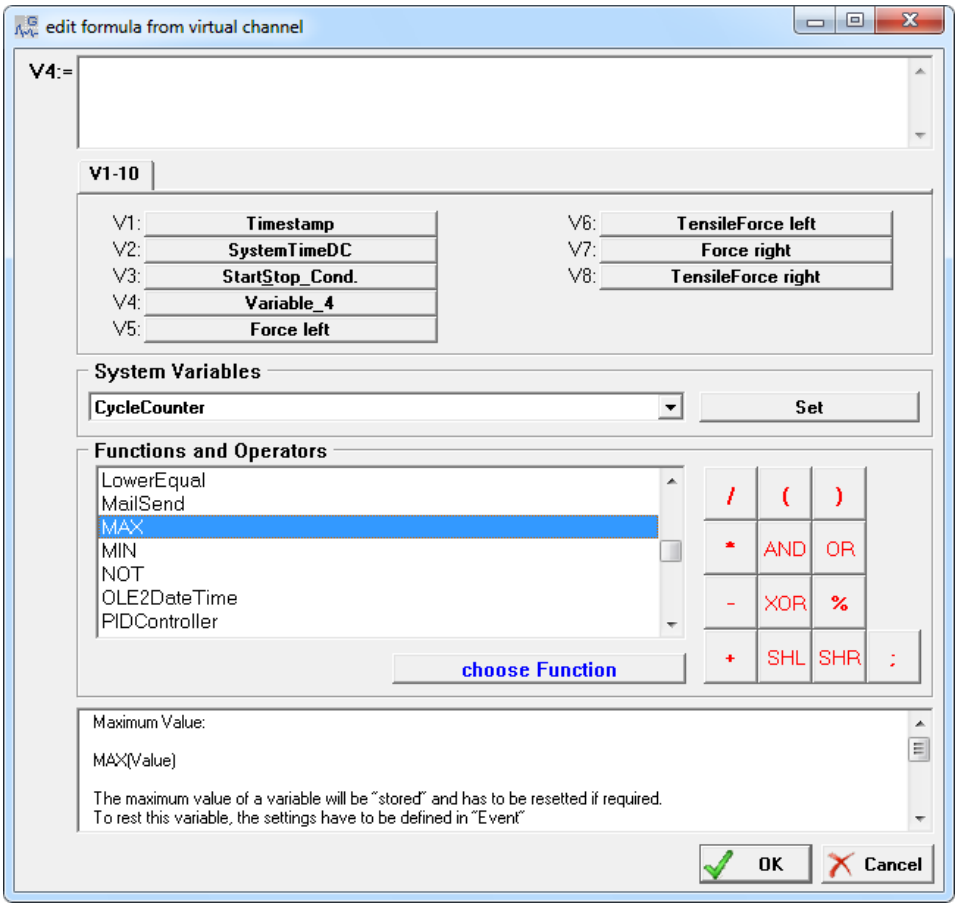



*Fig. 6-12 Defining a computation (formula).*

**Defining CAN signals**

In the context menu for virtual variables select **Add Variable > CAN_INPUT** or **CAN_OUTPUT**. After a double click on the variable, you can change the name and enter the CAN parameters (Fig. 6-13).

Alternatively, you can also generate several variables by importing signals from a CAN database in the Vector CANdb format (file extension dbc). Select the file and in the following dialog mark the signals which you want to import. Marking messages reads the complete message, so it is better to mark signals, because each variable only contains one signal.

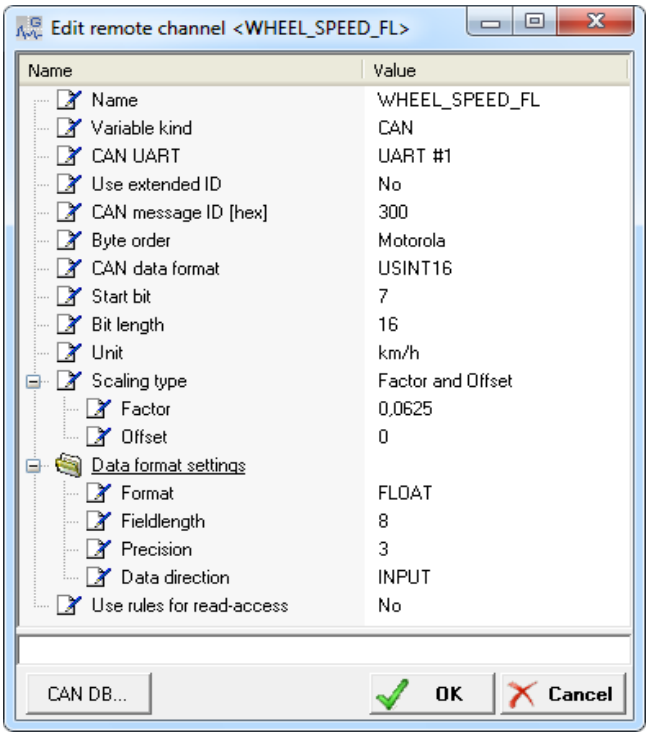



*Fig. 6-13 Example of a CAN signal.*

**Variable for computational results from a logger**

In order to be able to output computations from a logger (refer to section *Create statistics or arithmetic channels*, page 75) or to use them in other computations, you have to “pack” them into a virtual variable.

To do this, create the variable type LOGGER_INTERNAL using the context menu for the Virtual Variables.

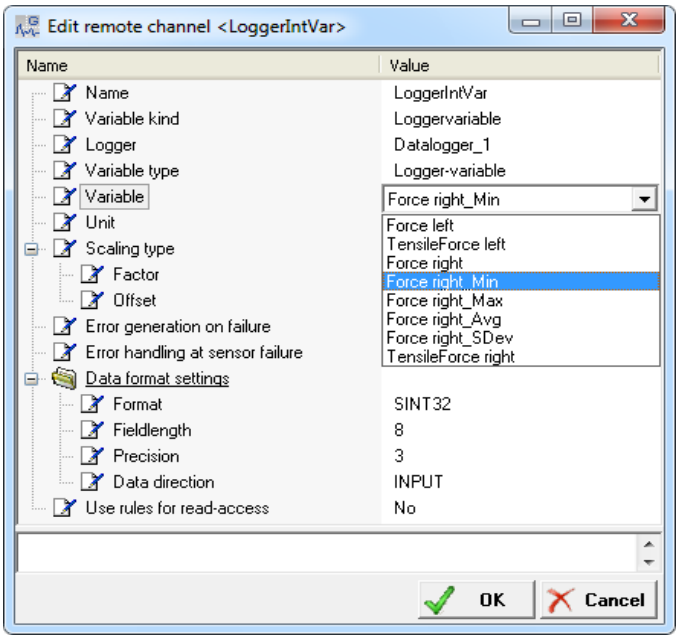



*Fig. 6-14 Configuration dialog for an internal logger variable*

Select the logger which computes the variable and state the variable. All available (defined) variables are shown in the list (Fig. 6-14). Specify the data format, how the value is to be transferred and note which output is provided for this (with EtherCAT or Modbus/TCP you have to use at least two bytes).

**Variable for the status of a logger**

You also create a variable for a logger status in a similar way as for a variable for computations from a logger.

To do this, create the variable type LOGGER_INTERNAL using the context menu for the Virtual Variables. Then specify ***Logger state*** as the **Variable type**.

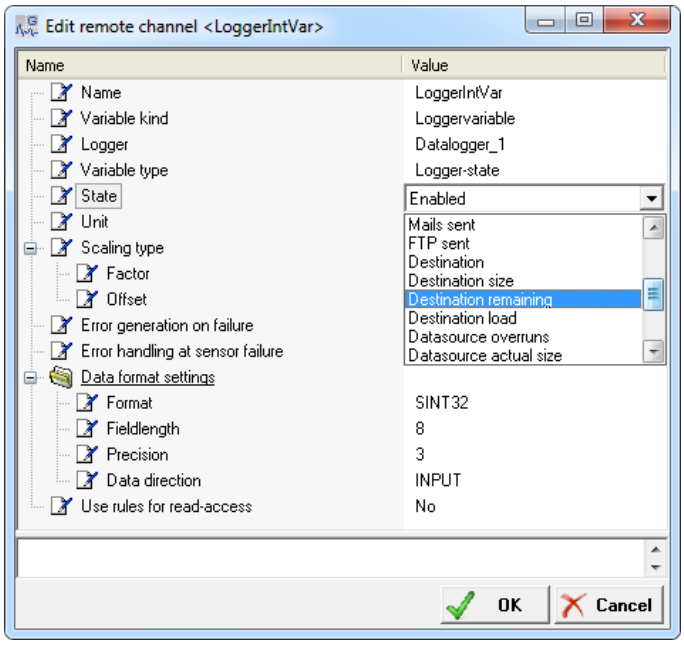



*Fig. 6-15 Configuration dialog for a logger status variable*

You then have numerous possibilities available in the Status field. For example, you can use the variable to check whether the logger is active (enabled), whether the start or stop trigger has occurred, how many files have been saved or also how much space is present on the target drive.

# 6.5 Online tools

## 6.5.1 Read data buffer (with measurements)

Click on  or use **File > Read Online Buffer from Controller** to be able to read out and view all values from the ring buffer.

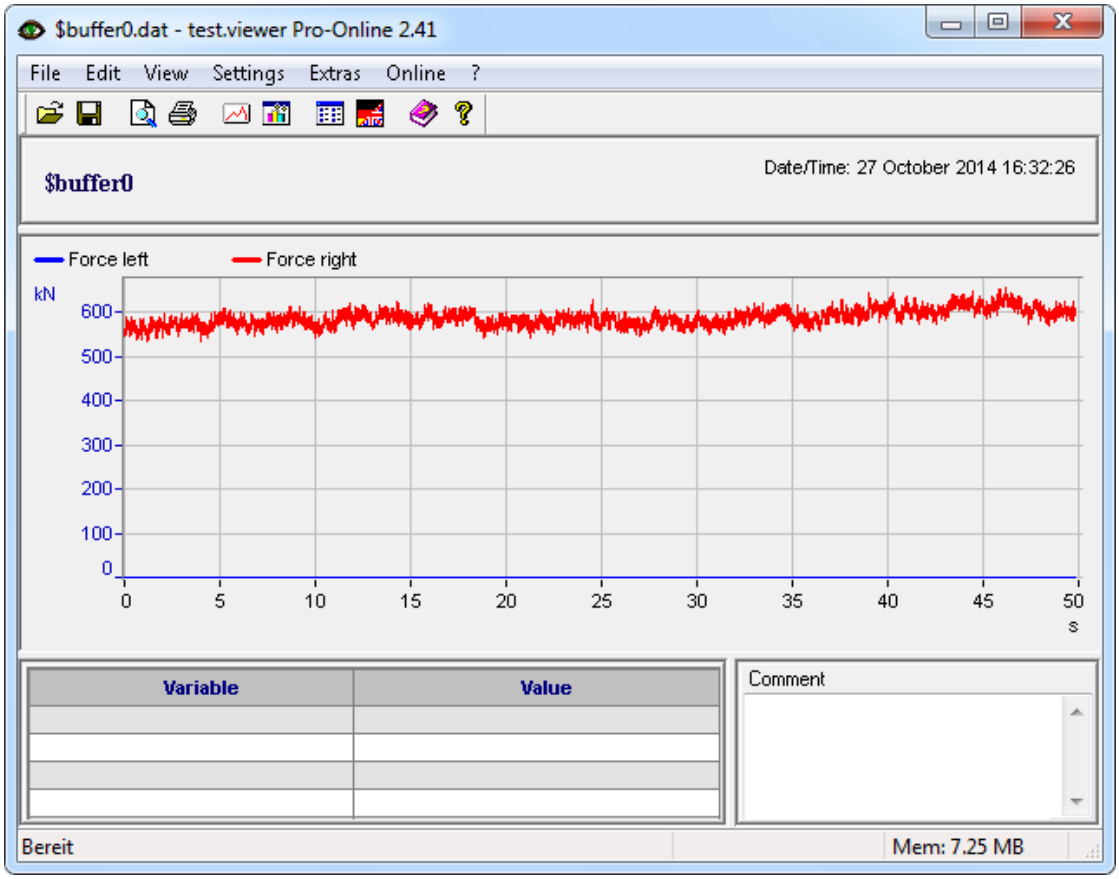



*Fig. 6-16 Display of the buffer content with test.viewer.*

You can carry out further settings using the menu and symbols, e.g. display the channel list, show the spectra or transfer a live stream of data.

## 6.5.2 Displaying measurements

Click on  or use **File > Read Online Values from Controller** to be able to view the values of your variables. If you have defined appropriate variables, you can also set initial values in this dialog.

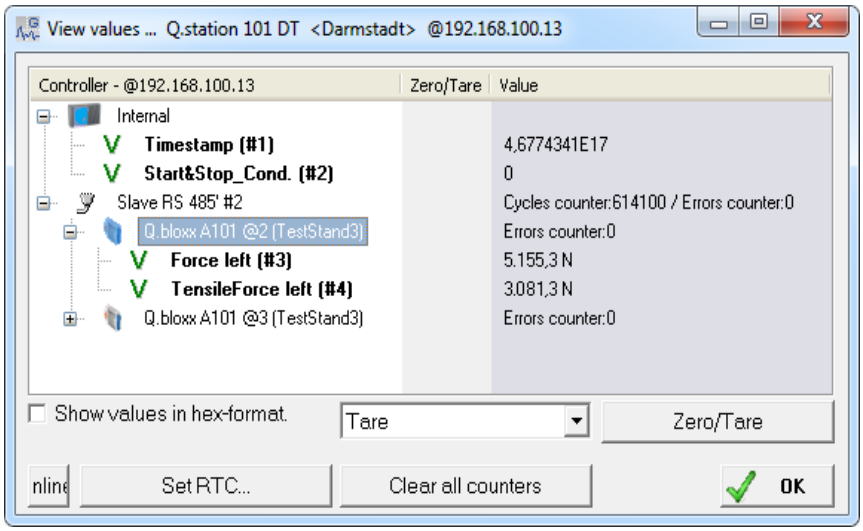



*Fig. 6-17 Dialog for displaying the variable values.*

In the dialog click on ***Online*** to display the values in a graph over time.

### 6.5.3 Reading module information

Click on  or use **File > Read Online Slaves Info from Controller** to be able to display information such as the address or serial number of your system.

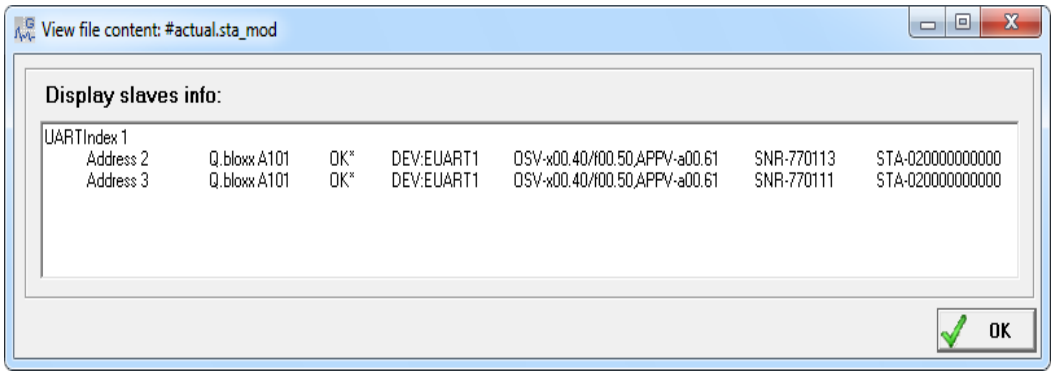



*Fig. 6-18 Display of the module information.*

### 6.5.4 Reading status information

Click on  or use **File > Read Online State Info from Controller** to display status information of your system.

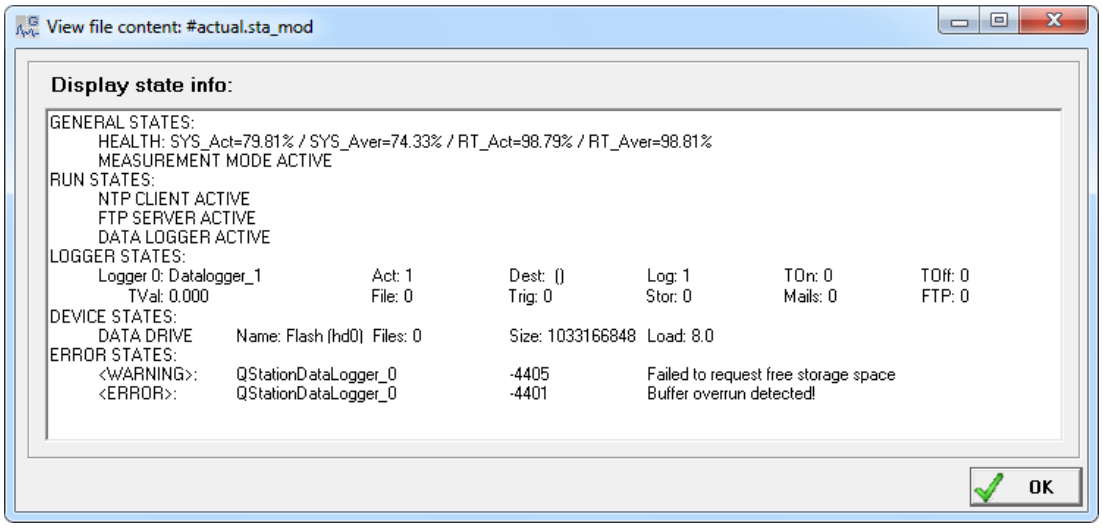



*Fig. 6-19 Display of the status information.*

### Explanation of logger information

| | |
|---|---|
| Act | States whether the logger is activated (1) or not (0). |
| Des | Target memory, e.g. sd0 (SD card). |
| Log | States whether the logger is currently recording (1) or not (0). |
| TOn | States whether the start trigger is active (1) or not (0). |
| TOff | States whether the stop trigger is active (1) or not (0). |
| TVal | Shows the current value of the trigger variable. |
| File | States the size of the current file in percent (0 - 100%). |
| Trig | States the progress of the current trigger process in percent (0 - 100%). |
| Stor | States how many files have been saved since starting the logger. |
| Mails | States how many mails have been sent since starting the logger. |
| FTP | States how many files have been sent since starting the logger. |

## 6.6 Firmware update

Recently purchased modules or Test Controllers always contain the latest firmware, i.e. the software in the modules or Test Controllers is the current version. However, if you want to combine these modules with older modules and/or Test Controllers, you must update all older modules or Test Controllers and it is essential to update your software to the latest version, because otherwise disturbances in operation due to a communication failure may occur.

**IMPORTANT**

The firmware update requires a restart of the Q.station Test Controller (switch off supply voltage and then on again). If you have no direct access to the device, you should use, for example, an outlet strip which can be switched via Ethernet.

The current firmware is in each case included in the latest installations of the programs ICP 100 or test.commander. Here, the program licenses apply to all versions of a program. If required, download the latest versions from our web site: www.gantner-instruments.com. You will find the programs under **Software > Download**.

### 6.6.1 Firmware update for Q.station

Before a new installation is carried out, uninstall the existing version using the Windows Control Panel. Install the latest version of the test.commander so that you can also install the latest version of the firmware on your PC.

**Procedure**

1. In the program test.commander select **Utilities > Controller Firmware Update**.

   The network in the segment of the PC address is searched and the Q.station Test Controllers which are found are displayed in the window. If no Test Controller is found, you may have to enter the address manually or set the IP address of your PC to the segment used by the Test Controller; refer also to Chapter 5, *Q.station 101 connection*, page 25.

2. Mark the Test Controller to be updated and click on ***OK***.

   The update tool is started and the Test Controllers present in the network are displayed again.

3. Mark the Test Controller to be updated and click on ***Update***.

   The Windows file dialog is opened and shows you the latest firmware version available on your PC. (After the installation of the latest version the latest firmware is also installed. The

version is found from the ID number of the Q.station (module ID number)).

4. Mark the newest of the available firmware versions (if necessary, switch to the detailed view) and click on **Open**.
   The update process is started. Wait until the update has finished. To conclude the update you have to restart the Q.station by interrupting the power supply for about five seconds, This is indicated with a dialog.
5. Click on ***OK*** and close the window of the update tool.

Wait until the Q.station has finished the restart. The firmware update is now completed.

### 6.6.2 Firmware update for modules

Install as required the latest version of the test.commander so that you can also install the latest version of the firmware on your PC.

**Procedure**

1. In the program test.commander select **Utilities > Slave Firmware Update**.
2. Make sure that the settings with regard to the interface used are correct: **Options > Communication Settings**.
3. Search for the Test Controller or the modules: ***Perform Scan***.
4. If the modules are connected via a Test Controller, in the next window mark the Test Controller to which the modules to be updated are connected and click on ***OK***.

# 7 Recording with the data logger

The Q.station 101 Test Controller enables you to save up to four sample rates in up to 20 data loggers. First, you specify how many sample rates you require (and associated data buffers). Then specify for the individual channels (UARTs) which sample rate it is to be used. In the third step you define the settings for the logger(s).

**IMPORTANT**
The settings of the channels to be recorded are based on the channel names. When you retrospectively rename channels, the (old) channel names are no longer found and the respective channels are deactivated.

The settings are made via the system view (allocation of the channels to the sample rates) and via the following context menus of the Test Controller:

- **Settings** for sample rate and data buffer,
- **Logger settings** for creating and setting the data loggers.

**IMPORTANT**
The configuration files are not completely downwards compatible. Therefore, check all the settings (logging rate, recording modes, etc.) and the variables if you have carried out a firmware update of the Q.station 101 Test Controller and then loaded an old project.

## 7.1 Setting the sample rates (and data buffers)

Call the dialog via the context menu **Settings** of the Test Controller (Fig. 7-1).

For each sample rate you also have to define a data buffer (ring buffer) which accepts the (original) values. Whether and how these values are processed later in the logger or via, for example, EtherCAT is not relevant here. You can, for example, use two data loggers and then “fill” one with the original sample rate and the other with a reduced data rate (= logging rate) (refer to Logging rate, page 76).

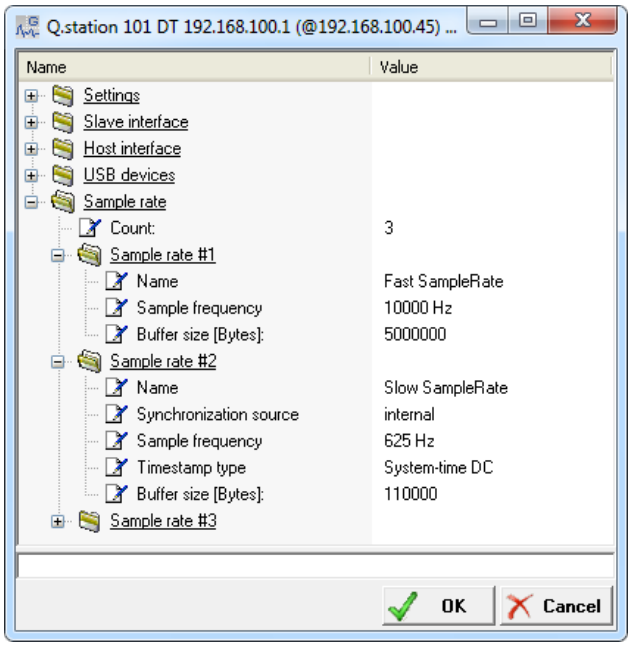



*Fig. 7-1 Setting the sample rates*

**Number**

Enter the required number of sample rates if you want to use more than one sample rate (up to 4 are possible).

➡ You should only use *one* sample rate per UART, especially with analog signals. *Two* sample rates which are to operate through *one* UART (one bus system) may otherwise lead to (small) inaccuracies in the time pattern of the measurements. If required, you can write single modules to a logger at a reduced data rate. However, the data buffer should be filled with the same sample rate for all modules of a UART. If in doubt, use the higher sample rate for all modules of a UART.

**Sample rate #1 to #4**

Sample rate #1 (ring buffer 1) has a special role: It is the basic sample rate of the system. No other sample rate can be higher than sample rate #1. At the same time it provides the synchronization base for the other sample rates, i.e. the other sample rates are synchronized to this sample rate such that at time points where a measurement is taken at a lower sample rate, this occurs at a time point where a measurement also takes place at sample rate #1. This is not the case only in the **Synchronization source: *external*** operating mode.

**IMPORTANT**

If you change sample rate #1, the system cycle frequency is also changed such that the ratio between the sample rate and the system cycle frequency remains the same. For example, if you have chosen a system cycle frequency of 1000 Hz and you then reduce

sample rate #1 from 10,000 Hz to 1000 Hz, then the system cycle frequency is also reduced to 1/10, i.e. to 100 Hz.

**Name**

You can leave the default name as it is or use the purpose of the sample rate in the name, e.g. ***SlowSampleRate***.

**Synchronization source**

With the first sample rate you cannot specify a synchronization source, because this sample rate is the basic sample rate of the system.

In the default setting the other sample rates are internally synchronized to sample rate #1. With sample rates 2 to 4 you can however synchronize to an external signal (**Synchronization source: *external***), e.g. to obtain a measurement with angular synchronization (refer also to Section 7.4.3, *Angular synchronous measurement*, page 92). In this case you have further entry fields available:

- **Digital input**
  Specify on which digital input the synchronization signal is applied. Note that DI1 may be used for time synchronization.
- **Edge**
  Specify whether the rising or falling edge is to be used.
- **Debouncing count**
  If the signal is produced by a mechanical contact, you can suppress the effect of a bouncing contact with this setting: The level is only valid when – at a sampling frequency of 48 MHz – the number of samples (measurements) specified here exhibit the appropriate level (edge-dependent).
- **Minimum time between two syncs**
  With this setting you can also suppress bouncing or brief disturbances after an edge: The next edge is only monitored when the time specified here has expired. Make sure that the specified time is shorter than the time between consecutive pulses at the highest rotational speed.
- **Time stamp reset mode**
  Here you can reset the cycle counter in particular for angular synchronous measurement. The Q.station 101 supports four different methods and further entry fields are provided depending on the method:
  - Reset on reference pulse, i.e. when a (single) pulse occurs on the **Reset input** (digital input), the counter is reset and the counting starts at one again with the next pulse.
  - Reset on reference gap, i.e. pulses must also occur on the **Reset input** simultaneously with the synchronization pulses. If the pulse on the reset input is missing, the counter is reset.

- Reset on falling edge of the reference signal, i.e. when the level on the **Reset input** goes low, the counter is reset.
- Reset on rising edge of the reference signal, i.e. when the level on the **Reset input** goes high, the counter is reset.

Whether, when and which method you can use, depends on the angle sensor used. Usually a pulse on reaching the zero or starting position is output, i.e. depending on the length of the pulse, you can use the first or one of the two last methods.

**Sample frequency**

No sample rate may be higher than sample rate #1. The sampling frequency is the frequency with which the measurements are read into the Test Controller and it is independent of the logging rate of the logger.

➡ The updating of virtual and system variables is not determined by the sample rate, but rather by the cycle frequency of the system; refer to **System cycle frequency** in Section 6.1.1.1, page 43.

**Time stamp type**

With sample rates 2 to 4 you can also specify a different time source as the ***System time DC*** (distributed clock). The system time is always used in sample rate 1. This must not be changed.

Specifying ***Cycle counter*** is practicable, for example, with external synchronization, in particular together with a reset signal; refer also to Synchronization source, page 69. With this you can, for example, implement a channel containing a measure for the angle and which is set to zero after each full revolution.

**Buffer size**

The data buffer operates as a ring buffer, i.e. the oldest values are overwritten once the data buffer has been filled. Each data buffer can be read simultaneously from several points: Up to 10 connections are possible just over Ethernet alone.

Overall, for all (four) data buffers you have 200 Mbyte available. This space can be divided as required. You can, for example, allocate half the space to one data buffer and divide the rest between the other three or use the whole space for one data buffer.

➡ The size must always be given in bytes, so therefore check the number of zeros. A figure given in seconds or similar is not possible.

## 7.2 Assign sample rates to the channels

In the **Sample rate** column of the system view select the required sample rate for the relevant channels (Fig. 7-2). Later in the logger settings only the channels are shown which are being acquired with the corresponding sample rate.

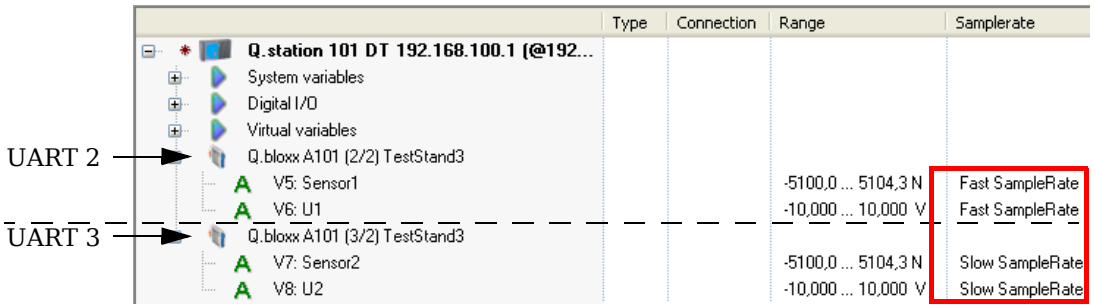



*Fig. 7-2 Selection of the sample rate, Fast sample rate and Slow sample rate illustrated (you define the names when setting the sample rate).*

➡ You should only use *one* sample rate per UART for all modules, especially with analog signals. *Two* sample rates which are to operate through *one* UART (one bus system) may otherwise lead to (small) inaccuracies in the time pattern of the measurements. If required, you can write individual modules to a different logger at a reduced data rate (logging rate). However, the data *buffer* should be filled with the same sample rate for all modules of a UART. If in doubt, use the higher sample rate for all modules of a UART.

## 7.3 Logger settings

The data loggers store the acquired values in one or more files. The storage speed (***Logging rate***) need not necessarily be the same as the sample rate. The files can be saved internally or externally and you can also set that the storage medium can be changed during the measurement. Refer also to Section 7.4, *Examples* page 83ff.

You call the logger settings via the context menu of the Test Controller or via .

**Create further loggers, delete loggers**

At least one logger is always present and you can create others with a click on above in the window. A maximum of 20 loggers is possible. A click on deletes the relevant logger with all the settings (for safety you are queried again before deletion).

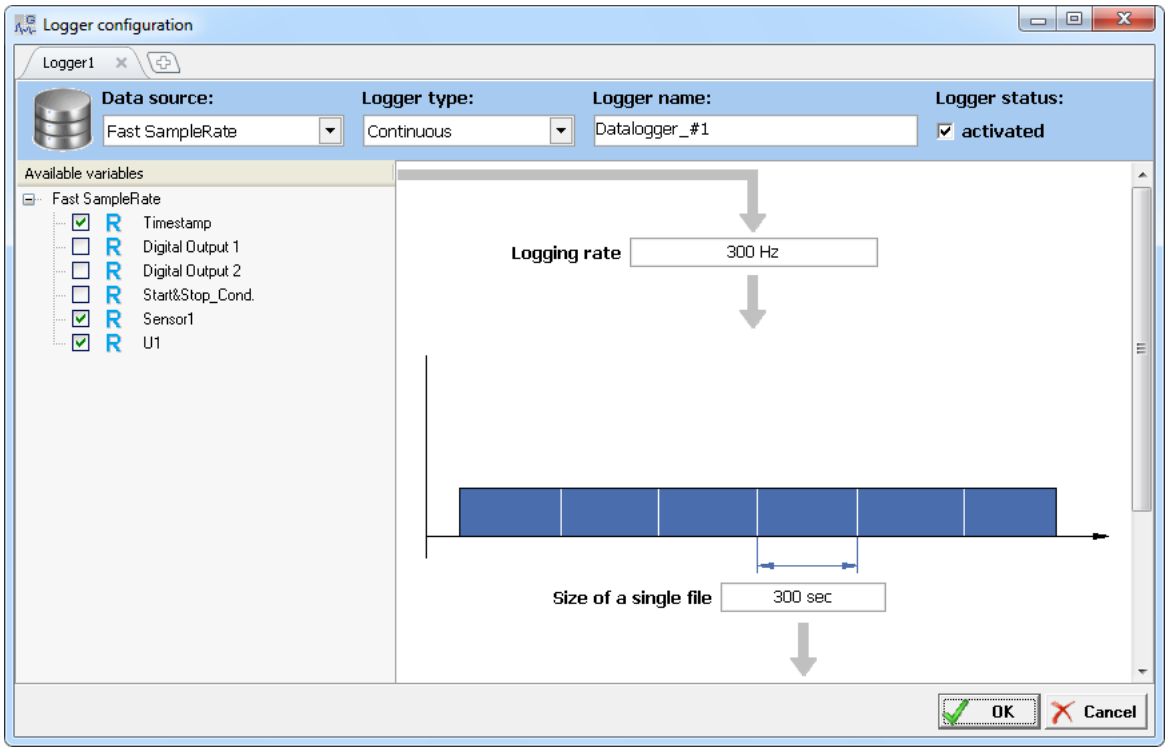



*Fig. 7-3 Logger settings (example of a continuous logger).*

## 7.3.1 General settings for loggers 1 to 20

**Data source**

Here you select which sample rate (which data buffer) is to be used for this data logger. You choose how many values are actually stored via ***Logging rate***; refer below.

**IMPORTANT**
The selection of any other data source resets all settings of the logger (right side).

**Logger type**

Here, you choose between ***Continuous***, ***Triggered*** and ***Event-based***. After selecting ***Triggered*** or ***Event-based*** other options are displayed so that you can set the trigger conditions.

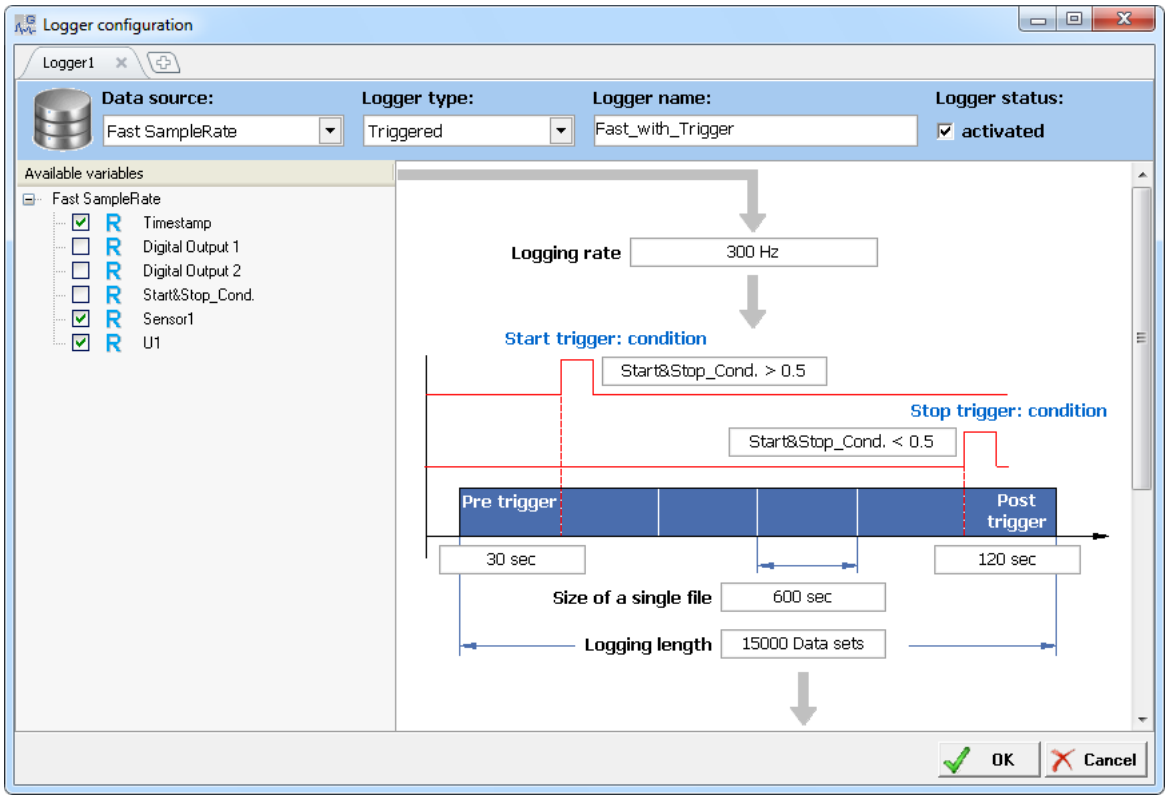



*Fig. 7-4 Logger type **Triggered.***

You will find the special settings for triggered or event-based measurements in Section 7.4; the settings valid for both logger types are explained in the following.

**Logger name**

We recommend that a name is assigned which characterizes the purpose of the logger, e.g. ***SlowMeasurement*** or ***ForceTrigger***.

Using placeholders in the logger name, you can define a suitable folder structure for your files. Specifying ***%YYYY-%mm-%dd/%HH/SlowMeasurement*** creates the following folder structure if the *first* measurement of the *first* file was acquired at 8am on 25.01.2014:
\2014-01-25\08\SlowMeasurement...

**Available placeholders**

| Place-holder | Meaning | Example |
|---|---|---|
| %a | Day of the week, abbreviated | Thu |
| %A | Day of the week | Thursday |
| %b or %h | Month name, abbreviated | Aug |

| Place-holder | Meaning | Example |
|---|---|---|
| %B | Month name | August |
| %c | Date and time | Thu Aug 13:55:02 2014 |
| %C | The first two places of the year figure | 20 |
| %d | Day with two figures | 23 |
| %D | Date in short form | 02/23/14 |
| %e | Day with two places (space character as prefix) | 1 |
| %F | Date (long form) | 2014-02-23 |
| %g | The last two places of the year figure, week-based | 14 |
| %G | Year figure, week-based | 2014 |
| %H | Hour in 24-hour format | 13 |
| %I | Hour in 12-hour format | 01 |
| %j | Day of the year | 235 |
| %m | Month with two figures | 02 |
| %M | Minute | 55 |
| %p | AM or PM | PM |
| %r | Time in 12-hour format | 01:55:02 pm |
| %R | Time in 24-hour format | 13:55 |
| %S | Seconds | 02 |
| %T | Time to ISO 8601 | 1:55:02 PM |
| %u | Day of the week to ISO 8601 (Monday = 1) | 4 |
| %U | Calendar week with Sunday of the first week = 1 | 33 |
| %V | Calendar week to ISO 8601 | 34 |
| %w | Day of the week as number with Sunday = 0 | 4 |
| %W | Calendar week with Monday of the first week = 1 | 34 |

| Place-holder | Meaning | Example |
|---|---|---|
| %y | The last two figures of the year figure | 14 |
| %Y | Year figure | 2014 |
| %z | Time offset with respect to UTC time according to ISO 8601 in minutes | +100 |
| %Z | Time-zone name or abbreviation | CDT |
| %% | Percent character | % |

**Logger status**

To use the logger with the following stated conditions you have to select ***Activated*** here (default setting). If the option is not active, the start/stop trigger is not evaluated. You can then activate or deactivate the logger status, for example, using the arithmetic function ***InternalLoggerControl***.

**Available variables**

All channels which operate with the sample rate selected at ***Data source*** are displayed. Select those which are to be recorded by this logger.

### Create statistics or arithmetic channels

If you do not want to record all values, but rather only statistical values such as minimum or maximum, etc., open the context menu for the variables (for the channel) and select the required value. **Add statistical values** generates all possible values (min/max/mean and the standard deviation) as subchannels. **Add empty arithmetic** generates a computation channel (formula). You have the same functions available as with the virtual variables; refer also to Section 6.4, *Virtual variable*, page 56.

Double click on the new channel to define the settings (Fig. 7-5).

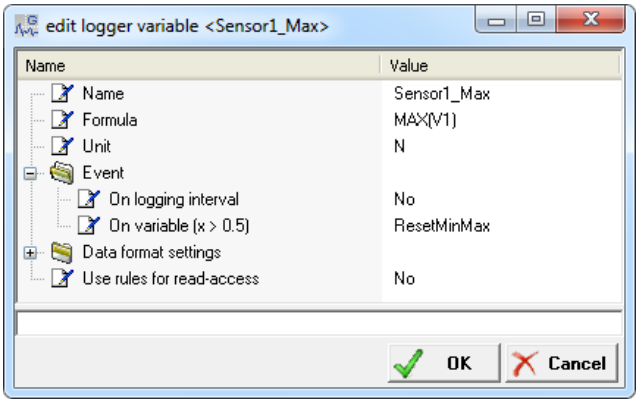



*Fig. 7-5 Dialog for the functions Maximum and Reset.*

If you have created a blank formula, click in the field to the right of ***Formula*** to call the input dialog. For the Max function illustrated in Fig. 7-5 you can either define that a variable or a digital input controls the reset (the variable ***ResetMinMax*** in the illustration) or that the value is reset after being stored at the logging rate (***On logging interval:***). ***Yes***). In this case the logging rate should be significantly lower than the sample rate. If necessary, create a dedicated logger for such values; refer also to the next section.

**Example:** Maximum function, sample rate 3000 Hz, logging rate 5 seconds. With this setting the maximum is formed over 15,000 measurements in each case and is then stored (1 value).

**Logging rate**

Here, you can define whether *all* values acquired with the sample rate specified under *Data source* (refer to Sample rate #1 to #4, page 68) are to be written into the data buffer or, for example, only every 10th value. A value greater than the sampling frequency is not permissible.

➡ The sample rate should be an integer multiple of the logging rate. For example, with a sample rate of 1000 Hz select a logging rate of, for example, 100, 200, 250, 500 or 1000 Hz, not however 300, 400 or 750 Hz.

Select either ***Hz*** and enter the sampling frequency specified for the sample rate or enter a value lower than the sampling frequency. In order to store only every 10th value, enter ***400 Hz*** for a logging rate (sampling frequency) of 4000 Hz.

If you only require a few values, e.g. you only want to save one value every ten seconds, specify ***Seconds*** for **Logging rate** and ***10*** for **Value**.

**Size of a single file**

Depending on the logger type, you can specify the size of a file as the number of data records, in seconds, bytes or as a number of events. A data record corresponds to *one* measurement over *all* channels activated at **Available variables**. When the specified value is reached, a new file is started if the recording has not yet finished.

**IMPORTANT**
Up to 10,000 files can be saved on a storage medium.

➡ If you specify the file size as “rounded” time, the individual files are started at rounded times (rounding time feature). For example, if the first recording starts at 13:33:43 h and 150 seconds (2.5 minutes) are recorded, then writing to the first file only takes place up to 13:36:00 h and then a new file is started, so that all other files start at “rounded” times (13:38:30 h, 13:41:00 h, etc.).

This is also taken into account with a specification in minutes. However, if you specify, for example, 55 seconds, “rounding” does not take place to 60 seconds, i.e. “non-rounded” starting times occur.

The file name is formed from the logger name and the date and time of the *first* measurement. Using placeholders in the logger name, you can define a suitable folder structure for your files; refer to Logger name, page 73.

**Event length**

This setting is only available with the ***Event-based*** logger type.

You define over how many data records, how long or how many bytes per event are to be logged. A data record corresponds to *one* measurement over *all* channels activated at **Available variables**.

**Logging length**

This setting is only available with the ***Triggered*** logger type.

You specify the total time over which logging is to occur. The setting is independent of the size of the single file, i.e. it can be smaller or larger. If the value for the **Logging length** is greater than the size of the single file, then several files are written. Refer also to Section 7.4, *Examples*.

### 7.3.2 Type of storage

The type of storage determines how and in what sequence writing occurs to the target memories specified in the following. Now you have basically four options:

1. Storage on the newly connected data medium

   Storage of the data occurs on the first available data medium with the file size specified under **Size of a single file**. If no further space is available here, the oldest two files are deleted and overwritten with new data (one file more is always deleted than written new in order to maintain a reserve). When you connect a second data medium, the storage on the active data medium is terminated immediately and is written to the new data medium. You can remove the old data medium once the blue LED (RUN) no longer flashes rapidly (storage has then terminated). Otherwise the copied data may be damaged, refer also to Section 4.4.1.2, *Storage to external memory running*, page 21. This means that you can write alternately to two storage media, e.g. an SD card and a USB storage medium.

2. Automatic drive selection

   Storage of the data occurs on the first available data medium in the list with the file size specified under **Size of a single file**. If no further space is available here, the next data medium in the list is used. If all available data media are full,

the oldest two files in all data media are sought. They are then deleted and the relevant data medium is used further. The oldest files of this data medium are always deleted and overwritten with new data (one file more is always deleted than written new in order to maintain a reserve). With this option all the specified data media are used like a single large ring buffer.
To prevent the loss of data you have to read out the data *via the network* before overwriting.

3. Moving files
   Storage of the data occurs on the specified data medium with the file size specified under **Size of a single file**. If no further space is available here, the oldest two files on this data medium are deleted and overwritten with new data (one file more is always deleted than written new in order to maintain a reserve).
   When you connect another data medium, the data are moved onto this data medium, i.e. they are deleted on the original data medium. The transfer is indicated by rapid flashing of the blue LED (RUN). You can remove the data medium once the blue LED no longer flashes rapidly. Otherwise the copied data may be damaged, refer also to Section 4.4.1.2, *Storage to external memory running*, page 21.
4. Copying files
   Storage of the data occurs on the specified data medium with the file size specified under **Size of a single file**. If no further space is available here, the oldest two files on this data medium are deleted and overwritten with new data (one file more is always deleted than written new in order to maintain a reserve).
   When you connect another data medium, the data are copied onto this data medium, i.e. they are retained on the original data medium and are not deleted as in the case of 3. With the selection of ***... only new data*** only the data which has not yet been copied are copied onto the newly connected data medium.
   The copying process is indicated by rapid flashing of the blue LED (RUN). You can remove the data medium once the blue LED no longer flashes rapidly. Otherwise the copied data may be damaged, refer also to Section 4.4.1.2, *Storage to external memory running*, page 21.

#### Protected mode

The protected mode prevents unauthorized reading of your data. For this you require a specially prepared data medium which is coded to the Q.station 101 and the data medium used. In this matter contact the Technical Support (refer to Chapter 9, *Inter-*

*national Sales and Service*, page 103), who will then produce an appropriate file for your storage medium using the details you provide. After selecting this option, the data are only transferred when a data medium coded in this way is connected. No data is transferred when another data medium is connected.

### 7.3.3 Target memories

Storage of the data always takes place on the specified data medium or on the first available medium where there are several media. The maximum size of the ***Internal memory*** (hd0) is 1 Gbyte.

➡ However, we recommend that the internal memory is only used with low data rates, because here the number of measurements which can be saved per second is relatively low.

Otherwise select a fast SD card, a USB drive or a network drive.

**IMPORTANT**
Up to 10,000 files can be saved on a storage medium.

Whether and when writing to further media occurs depends on the settings for **Storage type**.

**IMPORTANT**
If only one medium is specified, this medium must not be removed as long as one of the loggers is active. Otherwise data may be lost. With storage on USB make sure that the correct USB interface is specified (refer to Fig. 4-1, page 17).

To facilitate the connection of several USB data media via a USB hub you can select various ports for the relevant USB interface.

If, as in Section 6.1.3.4, *Network drives*, page 49, you have defined one or several network drives, you can also define them as the target memory: select the ***Name*** specified there.

### 7.3.4 Trigger and even settings

**IMPORTANT**
You must *measure* the channel used for the trigger condition or the event or the condition variable with the logger sample rate (same sample rate). The channel must therefore be listed in the section **Available variables**. Storing the channel is not necessary, i.e. you do not need to activate the channel there.

The difference between ***Event-based*** and ***Triggered*** is that with *Triggered* both start and stop occur via a trigger event, whereas with ***Event-based*** only the start is initiated by an event (triggered) and a stop trigger does not exist: The quantity of data specified under ***Event length*** is always recorded.

**Start trigger, event**

You can specify a channel or a computation as the ***Condition*** for the trigger. This can also be a channel, for which writing into the variable occurs, e.g. via EtherCAT from a PLC or from test.con. Click on the entry field to call the dialog for input. The field is displayed with a red font as long as no condition or an invalid one is specified. Specify whether the variable has to exceed (**>**), undercut (**<**), be greater than or equal to (**>=**), be less than or equal to (**<=**), be identical to (**==**) or only not the same as (***!***=) the specified value, so that the trigger or event is initiated.

**IMPORTANT**
The start trigger must also be recorded.

**Stop trigger**

Click on **Stop trigger** to change over between ***Condition*** and ***None***. In the ***None*** setting storage is terminated when the **Logging length** is reached.

You can specify a channel or a computation as the ***Condition***. This can also be a channel, for which writing into the variable occurs, e.g. via EtherCAT from a PLC or from test.con. Click on the entry field to call the dialog for input. The field is displayed with a red font as long as no condition or an invalid one is specified. Specify whether the variable has to exceed (**>**), undercut (**<**), be greater than or equal to (**>=**), be less than or equal to (**<=**), be identical to (**==**) or only not the same as (***!***=) the specified value, so that the trigger is initiated.

**IMPORTANT**
The stop trigger must also be recorded.

**Pre-trigger**

Using a pre-trigger you can define that a certain time is also recorded before the occurrence of the above defined start event. The figure can be given in seconds or as a number of data records. Click on **Pre-trigger** to switch the option on or off.

**IMPORTANT**
The pre-trigger must fit into the buffer specified for the sample rate; refer to Buffer size, page 70.

When you specify a pre-trigger, values are continuously recorded in the internal memory. If the condition is fulfilled, the data present here is stored in the logger file.

**Post-trigger**

Here specify whether recording is to continue after the stop signal. The figure can be given in seconds or as a number of data records. Click on **Post-trigger** to switch the option on or off.

**IMPORTANT**
With repeated measurements the pre-trigger condition is only evaluated again after the post-trigger has run.

**Event length**

This setting is only available with the ***Event-based*** logger type.

You define over how many data records, how long or how many bytes per event are to be logged. A data record corresponds to *one* measurement over *all* channels activated at **Available variables**.
Refer also to Section 7.4, *Examples*.

**Logging length**

This setting is only available with the ***Triggered*** logger type.

You specify the total time over which logging is to occur. The setting is independent of the size of the single file, i.e. it can be smaller or larger. If the value for the **Logging length** is greater than the size of the single file, then several files are written.
Refer also to Section 7.4, *Examples*.

### 7.3.5 Also send data to FTP server

In order to be able to send data to an FTP server, you must first define the data for the FTP server(s); refer to *Client settings* in Section 6.1.3.3, page 48. The data are sent when the **Size of a single file** is reached.

Here, you select the FTP server.

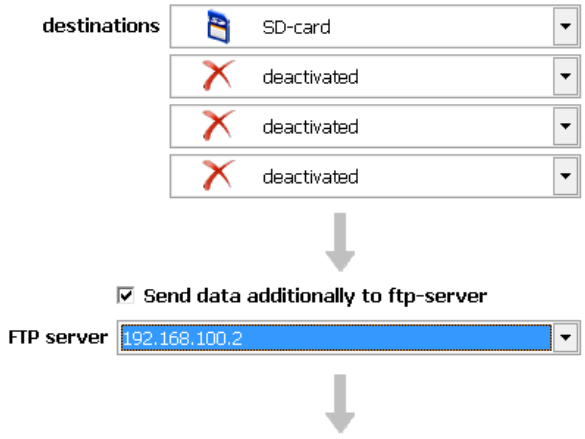



*Fig. 7-6 Send data to an FTP server*

**Tip**

Using the variable *SendFTPVirtualBufferFile*, you can also trigger the sending of a file to an FTP server. In this case you can leave the entry blank.

## 7.3.6 Send e-mail

In order to be able to send e-mails you must define the possible selections for the fields ***Address***, ***Subject*** and ***Content***; refer also to Section 6.1.3.6, page 50. The e-mail is sent when the **Size of a single file** is reached; the file is sent as an attachment.

**Make selection**

You call the logger settings via the context menu of the Test Controller or via .

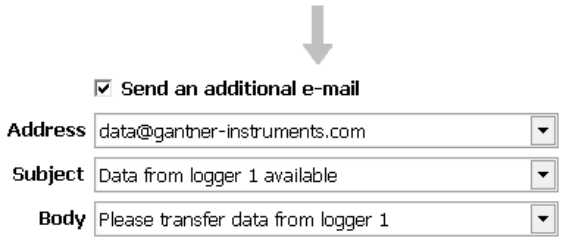



*Fig. 7-7 Send e-mail.*

Activate ***Send an additional e-mail*** and select one of the settings for the **Address**, **Subject** and **Body**.

## 7.4 Examples

The following includes configuration examples for frequently occurring measurement tasks.

### 7.4.1 Continuous recording

#### 7.4.1.1 Storage on a data medium, storage with or without data reduction

Continuous recording of all data is to take place. The values acquired with sample rate #1 (StandardSampleRate was chosen as the name) are to be written to a log file with a logging rate of 10 Hz (ten values per second) over 300 seconds in each case. If the set sample rate #1 (StandardSampleRate) is higher than the logging rate, data reduction occurs. A logging rate higher than the sample rate is not permissible. Each file contains 3000 values per channel (300 seconds at 10 Hz, Fig. 7-8, page 84).

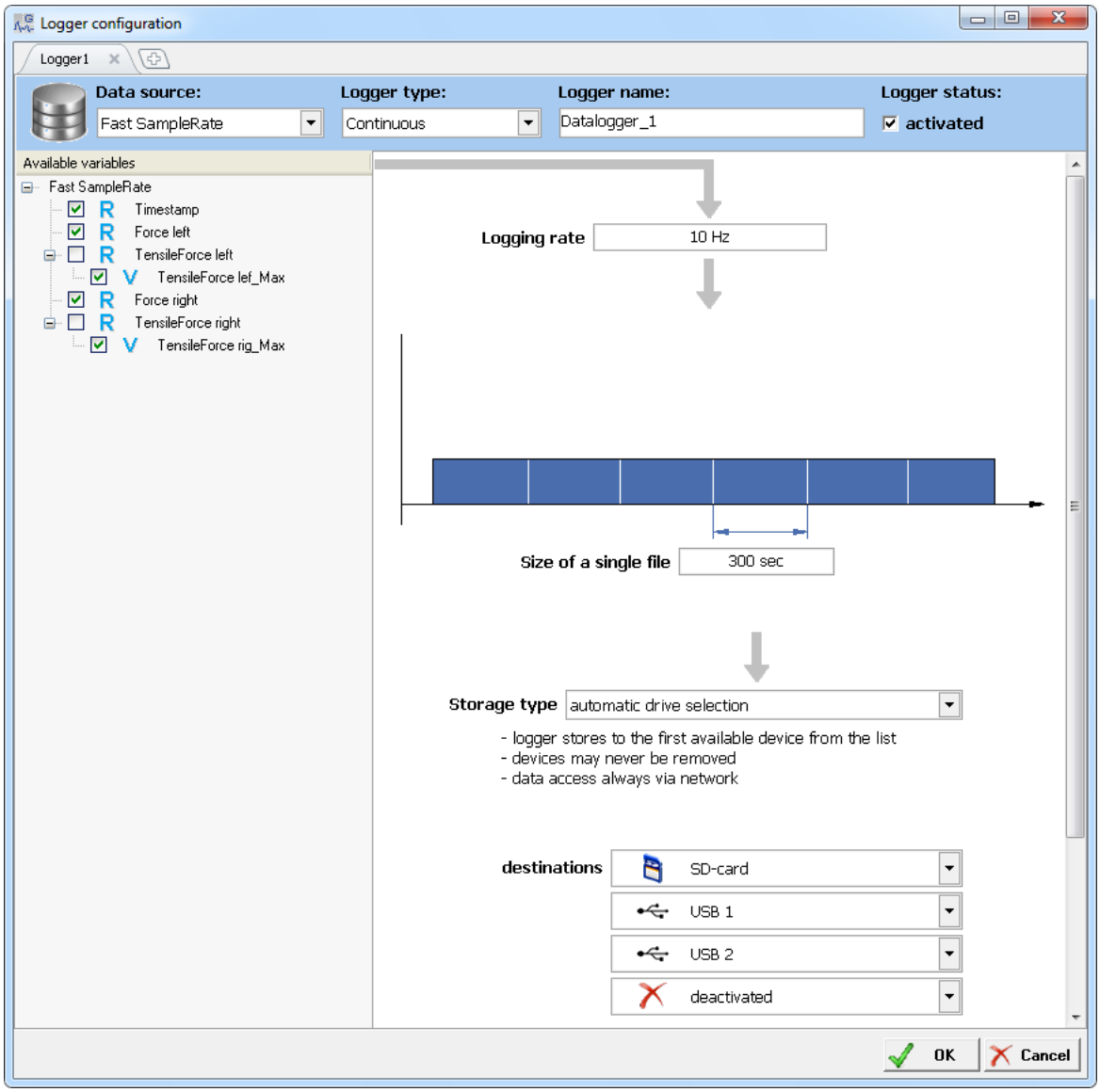



*Fig. 7-8 Example of a continuous recording.*

The data are written to the SD card and must therefore be moved from time to time from there to a different medium, e.g. via the network. Otherwise, the two oldest files are deleted and overwritten with new data (one file more is always deleted than written new in order to maintain a reserve).

#### 7.4.1.2 Storage on several data media, storage with or without data reduction

Continuous recording of all data is to take place. The values acquired with sample rate #1 (StandardSampleRate was chosen as the name) are to be written to a log file with a logging rate of 10 Hz (ten values per second) over 300 seconds in each case. If the set sample rate #1 (StandardSampleRate) is higher than the

logging rate, data reduction occurs. A logging rate higher than the sample rate is not permissible. Each file contains 3000 values per channel (300 seconds at 10 Hz, Fig. 7-9, page 86).

The data are first written to the SD card, then to the storage medium on USB1 and finally to the storage medium on USB2 (refer to Fig. 4-1, page 17). If all available data media are full, the oldest two files are sought. In the example they are located on the SD card and are then deleted. Thereafter, the SD card continues to be used; the oldest files of this data medium are always deleted and overwritten with new data (one file more is always deleted than written new in order to maintain a reserve). When all files have been overwritten once, the next target memory is used, here the storage medium on USB1.

With this option all the specified data media are used like a single large ring buffer. To prevent the loss of data you have to read out the data *via the network before overwriting.*

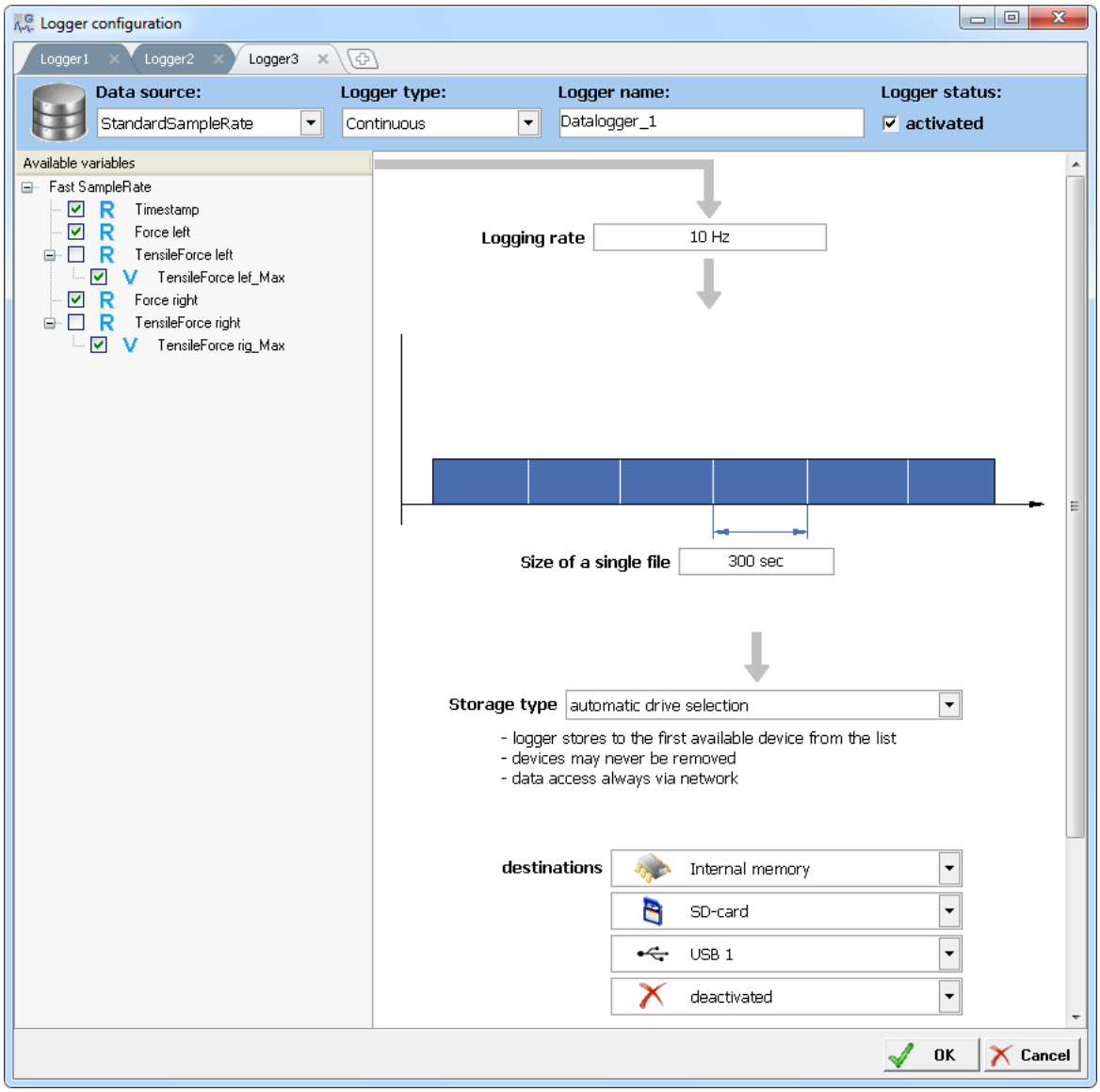



*Fig. 7-9 Continuous recording on several data media.*

### 7.4.1.3 Storage on last connected data medium, storage with or without data reduction

Continuous recording of all data is to take place. The values acquired with sample rate #1 (StandardSampleRate was chosen as the name) are to be written to a log file with a logging rate of 10 Hz (ten values per second) over 300 seconds in each case. If the set sample rate #1 (StandardSampleRate) is higher than the logging rate, data reduction occurs. A logging rate higher than the sample rate is not permissible. Each file contains 3000 values per channel.

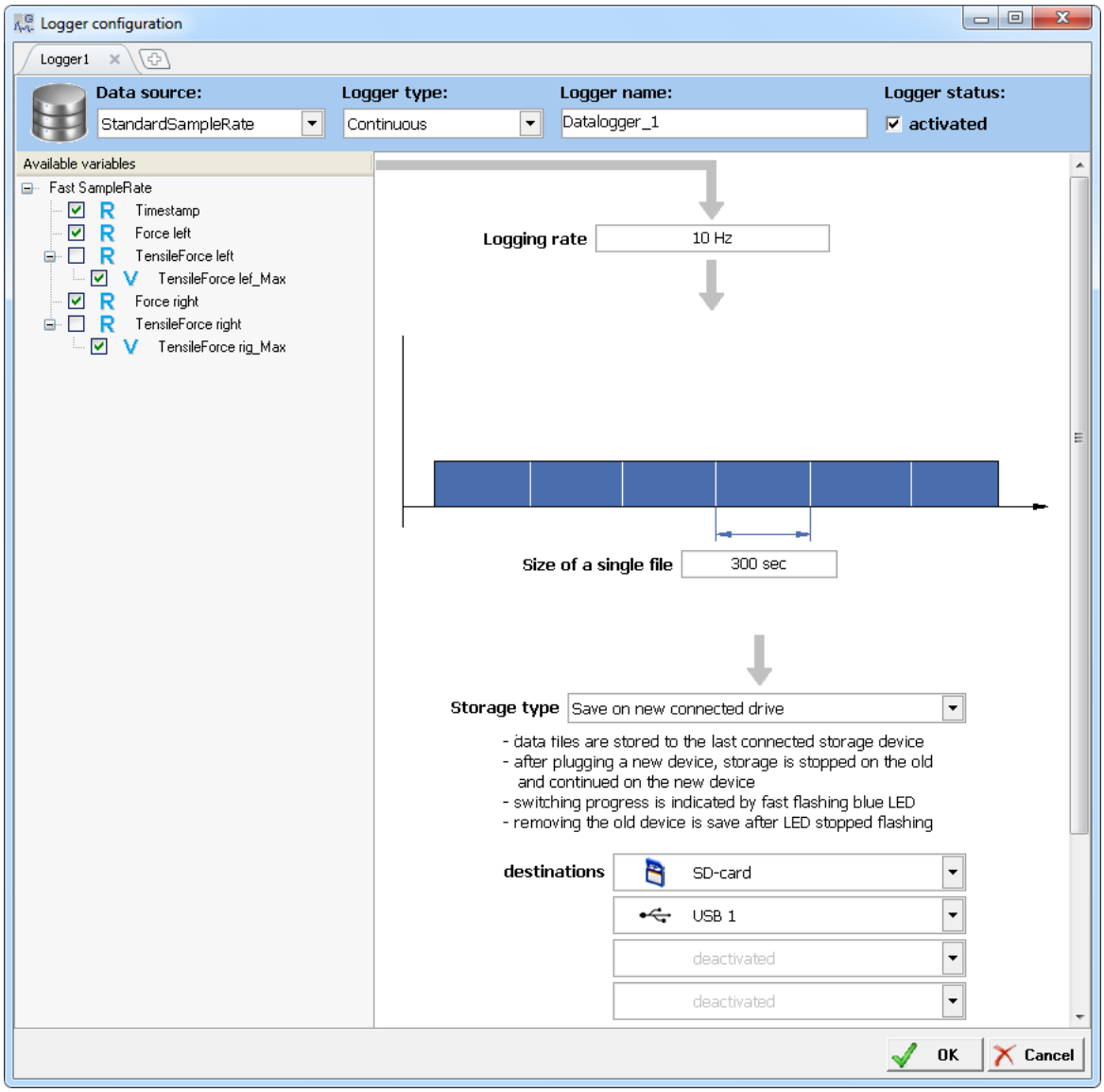



*Fig. 7-10 Example of a continuous recording (USB1 is the left USB interface; refer to Fig. 4-1, page 17).*

The data are written to the first available storage medium (to the Fig. 7-10 SD card or USB storage medium). You must therefore promptly connect the second medium specified as the target memory. Otherwise, the two oldest files are deleted and overwritten with new data (one file more is always deleted than written new in order to maintain a reserve).

When you connect the second storage medium (***Destinations***), storage on the current medium is terminated, i.e. normally a file containing less than 300 seconds is produced. The blue LED (RUN) on the Q.station 101 flashes rapidly until the write process starts on the new medium. With larger storage media detection may take longer, so it is essential to wait until the LED starts to flash rapidly. When the blue LED flashes slowly again (this may

take longer than a minute), you can and must remove the first storage medium. Remove the data medium only when the flashing has stopped as otherwise the files may be damaged. The changeover from one storage medium to the next takes place when you connect a new medium.

## 7.4.2 Recording of a single event (repeated)

### 7.4.2.1 Control by start/stop condition and time limitation, storage on one data medium, transfer on connection of another one

Recording is to occur when the variable Start&Stop_Cond. is greater than 0.5 (the variable is a digital input and contains the value 0 or 1). Overall, measurement should occur until the variable Start&Stop_Cond. is again smaller than 0.5 or until 30 minutes have been recorded. Recording should take place at 10 Hz.

With the settings from Fig. 7-11, page 89 the recording starts when the variable Start&Stop_Cond. is greater than 0.5. As long as this is the case, a file is produced at 10 Hz for each time for a maximum of 5 minutes (**Size of a single file**) and then a new file is started. When the variable Start&Stop_Cond. is smaller than 0.5 or after 30 minutes at the latest (**Logging length** 1800 seconds), the recording is stopped, i.e. the file last produced is generally smaller than 300 seconds.

When a new start trigger then occurs, i.e. when the variable Start&Stop_Cond. is again greater than 0.5, the recording starts again.

The data are written to the SD card (***Destinations***). You must therefore promptly connect another storage medium, e.g. a USB data medium. Otherwise, the two oldest files are deleted and overwritten with new data (one file more is always deleted than written new in order to maintain a reserve). When you connect another storage medium, the transfer of the files begins. The blue LED (RUN) on the Q.station 101 flashes rapidly until the write process on the new medium has concluded. With larger storage media this process and also the detection of the storage medium may take longer, so it is essential to wait until the LED starts to flash rapidly. Once the blue LED flashes slowly again, you can remove the data medium (e.g. tap ***Eject*** on the display). Remove the data medium only when the flashing has stopped as otherwise the files may be damaged.

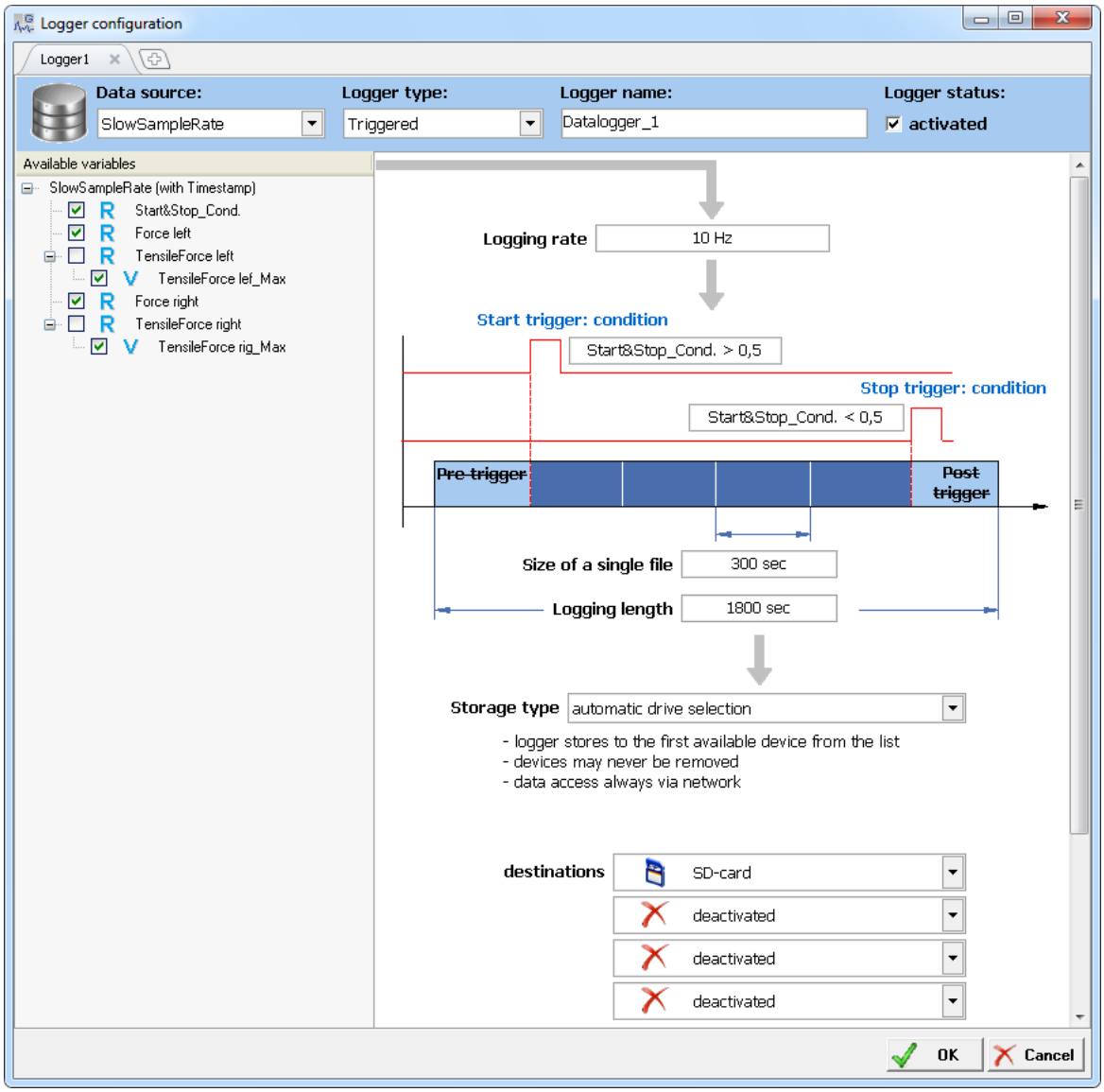



*Fig. 7-11 Example of a triggered recording with time limitation.*

7.4.2.2

**Start and stop a measurement with pre- and post-trigger, storage on one data medium, transfer on connection of another one**

Recording is to occur when the variable Start&Stop_Cond. is greater than 0.5 (the variable is a digital input and contains the value 0 or 1). However, the recording is to start before this event and the recording should also contain the measurements of 30 seconds before this event. Measurement should continue overall until the variable Start&Stop_Cond. is again less than 0.5 plus a run-on period of one minute. The other recording parameters are as given in the previous example.

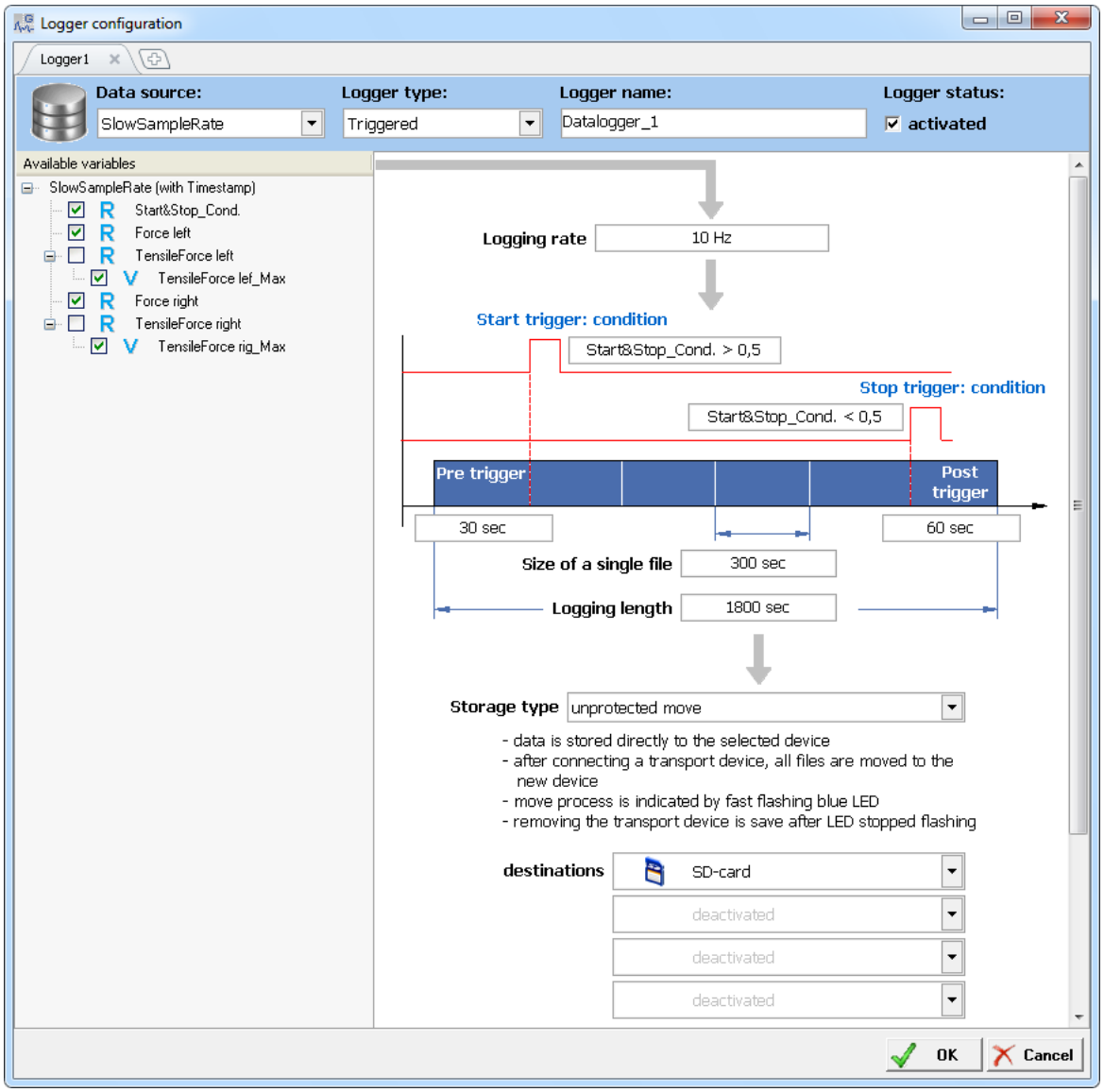



*Fig. 7-12 Example of a triggered recording with start and stop trigger.*

With the settings from Fig. 7-12, page 90 the values to be stored are initially written to an intermediate buffer which is 30 seconds in size, i.e. it contains 300 measurements per channel. When the variable Start&Stop_Cond. is greater than 0.5, this buffer is written to a file. (If the time for the pre-trigger is greater than the **Size of a single file**, then several files are written.) Thereafter, a file is produced with 10 Hz in each case over 300 seconds and then a new file is started. When the variable Start&Stop_Cond. is less than 0.5, the recording continues for a further 60 seconds and, where necessary, a new file is also started.

At the end of the measurement storage occurs again in an intermediate buffer and when a new start trigger occurs, i.e. when the

variable Start&Stop_Cond. is again greater than 0.5, the recording starts again.

**IMPORTANT**
The start condition is only checked again when the post-trigger has terminated. If the start condition is fulfilled before the pre-trigger has expired, recording is started immediately.

The data are written to the SD card (***Destinations***). You must therefore promptly connect another storage medium, e.g. a USB data medium. Otherwise, the two oldest files are deleted and overwritten with new data (one file more is always deleted than written new in order to maintain a reserve). When you connect another storage medium, the files so far created on this medium are moved, i.e. they are deleted from the SD card after being written on the new storage medium. The blue LED (RUN) on the Q.station 101 flashes rapidly until the write process on the new medium has terminated. With larger storage media this process and also the detection of the storage medium may take longer, so it is essential to wait until the LED starts to flash rapidly. When the blue LED flashes slowly again (this may take longer than a minute), you can remove the (last connected) storage medium. Remove the data medium only when the flashing has stopped as otherwise the copied files may be damaged. Storage of the current measurements continues in the background during the transfer.

#### 7.4.2.3 Event-based recording with pre-trigger and storage on a network drive

Recording is to occur when the variable Start_Cond. is greater than 0.5 (the variable is a digital input and contains the value 0 or 1). Overall, each event is to be recorded with 10 seconds pre-trigger and 30 seconds subsequent post-trigger (event length). Recording should take place at 1000 Hz.

Using the settings in Fig. 7-13 the pre-trigger buffer is initially filled. When the variable Start_Cond. is greater than 0.5, this buffer is written to a file along with the following 30 seconds. Recording takes place in each case at 1000 Hz for 40 seconds. Thereafter the pre-trigger buffer is filled again and the event awaited. Once the specified 50 events have been recorded, the file is closed and a new one started.

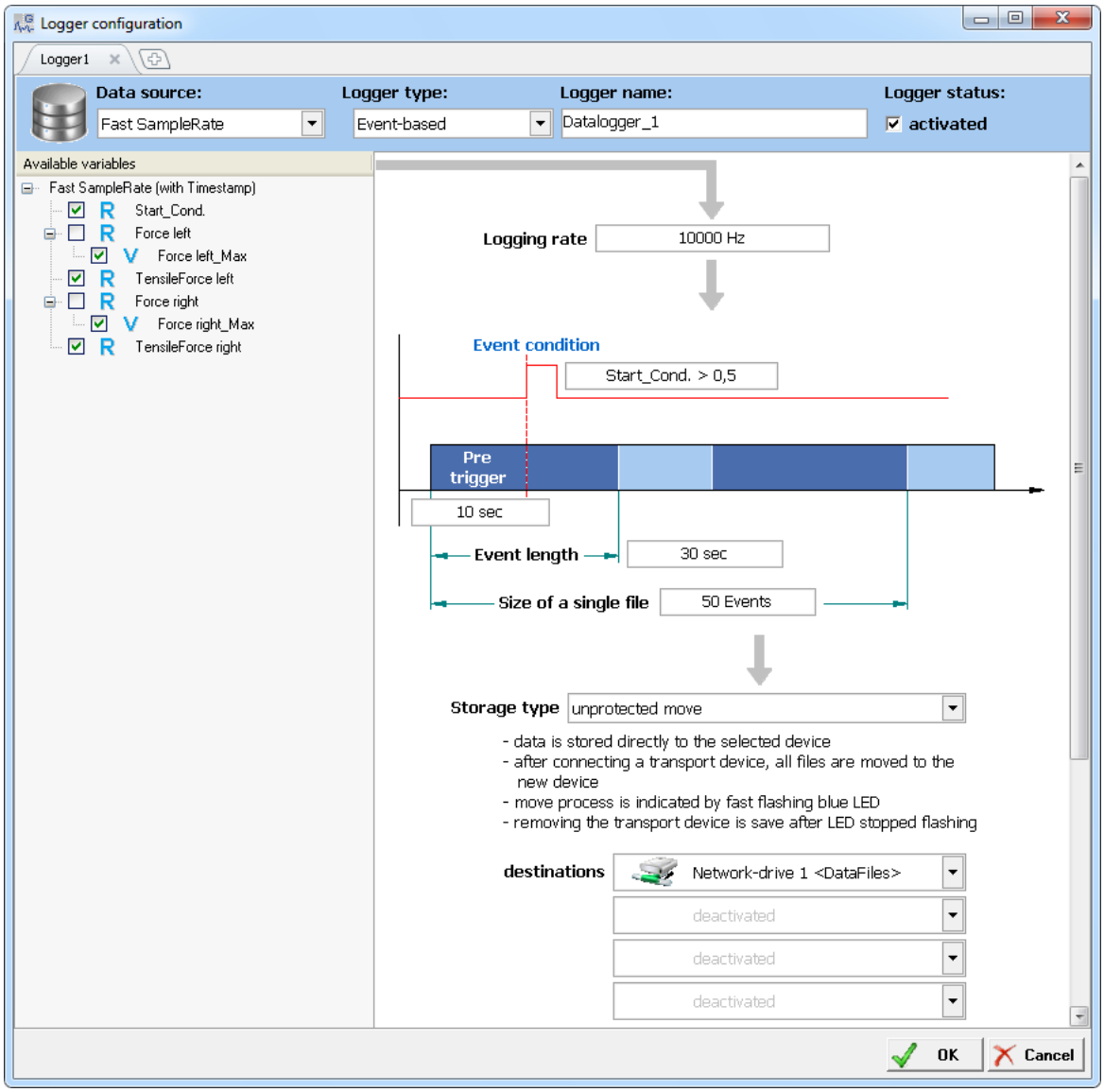



*Fig. 7-13 Event-based measurement.*

The data are written to the network drive which you have specified in the basic settings using **Host interface > Network drive**. In this respect refer to Chapter 6, *Basic configuration of your system*, page 41, and Section 6.1.3.4, page 49.

### 7.4.3 Angular synchronous measurement

Carry out the basic setting for this measurement using the context menu **Settings** of the Test Controller (Fig. 7-14).

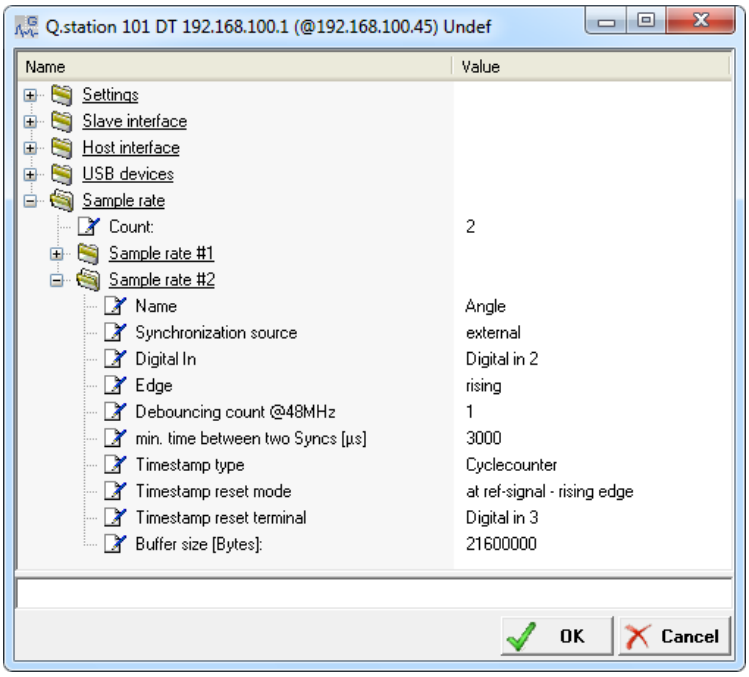



*Fig. 7-14 Example of an angular synchronous measurement.*

The signal from the rotary sensor (360 pulses/revolution) is fed into DI2. The sensor has a zero index signal (pulse-shaped) which is fed into DI3. The maximum rotational speed is below 20,000 rpm, i.e. at least three milliseconds must pass before the next pulse can come.

The settings for the logger take place as in the other examples.

# 8 Access to data in the Q.station

You have several ways of reading out data from the Q.station or of operating the Q.station remotely.

1. From your PC you can access the Q.station drives, e.g. the internal memory hd0, through a network and SMB/CIFS.
2. You can remotely control the Q.station through VNC, e.g. using a VNC viewer.
3. You can transfer the data from the Q.station to an FTP server; refer to FTP client in Section 6.1.3.3, page 48.

## 8.1 Access through SMB/CIFS

Enter the IP address of the Q.station on your PC in the search box (Fig. 8-1) and press Return.

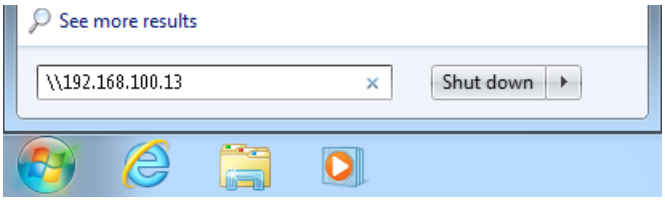



*Fig. 8-1 Entering the IP address.*

The Q.station then appears with the IP address in the list of network drives or PCs (Fig. 8-2 on page 96).

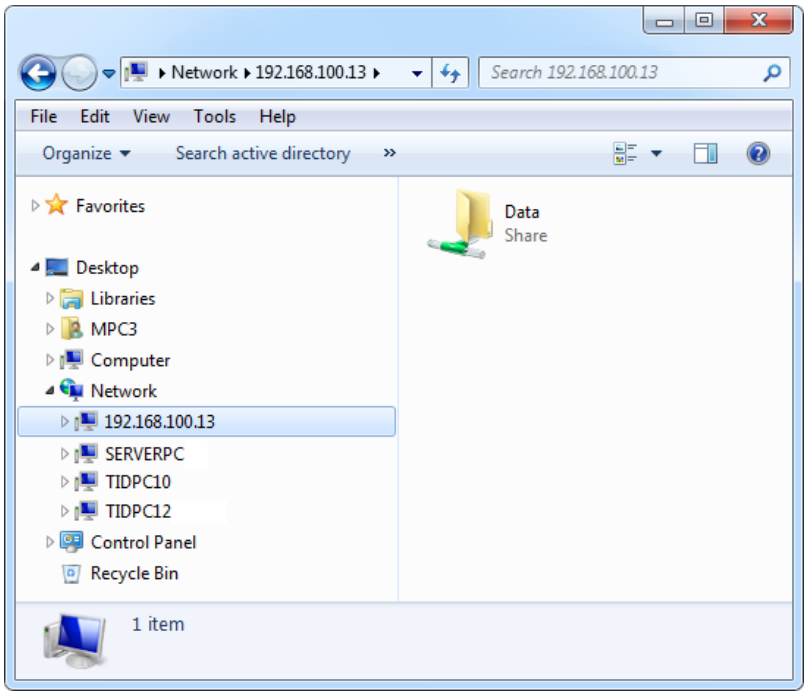



*Fig. 8-2 Q.station as network drive.*

You must enter the user name and password to be able to access the data. To do this, open the entry (the Data directory is shown) and double click on this directory (Fig. 8-3).

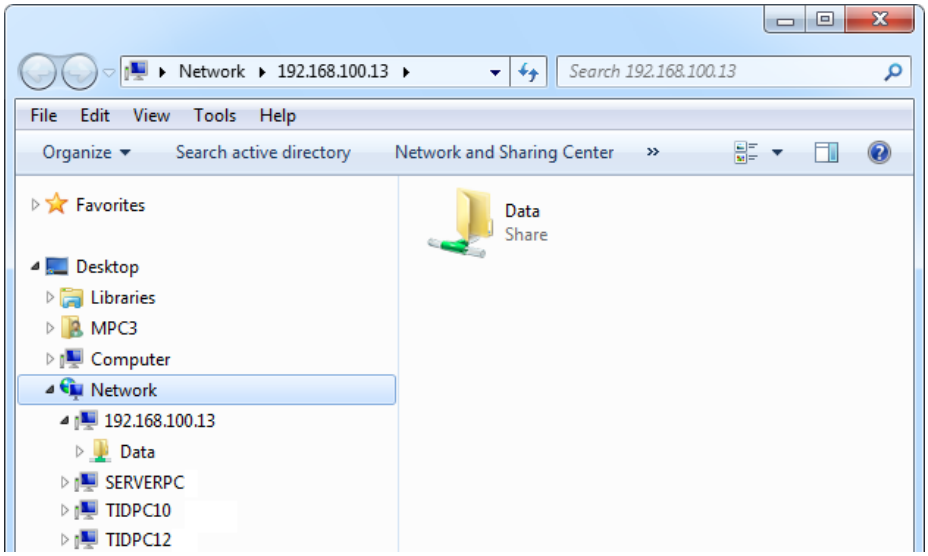



*Fig. 8-3 Data directory on the Q.station.*

In the following dialog enter the user name (***data***) and password (***data***).

➡ Note that Windows assumes that you want to log onto the current domain (if you are a member of a domain). In this case you must specify \data to bypass the prefixed domain (Fig. 8-4).

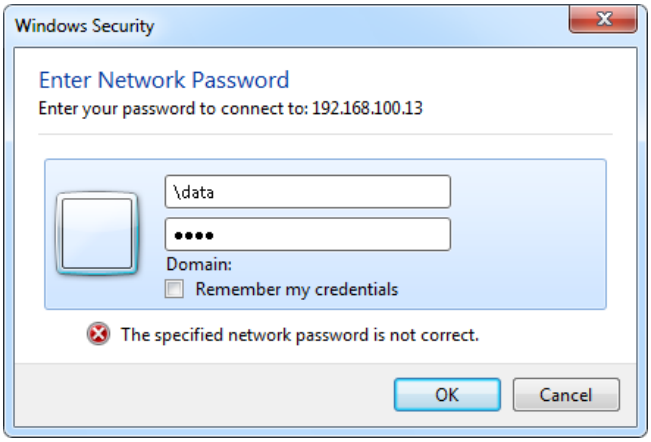



*Fig. 8-4 Login dialog.*

Then you are shown the internal memory as hd0 (Fig. 8-5).

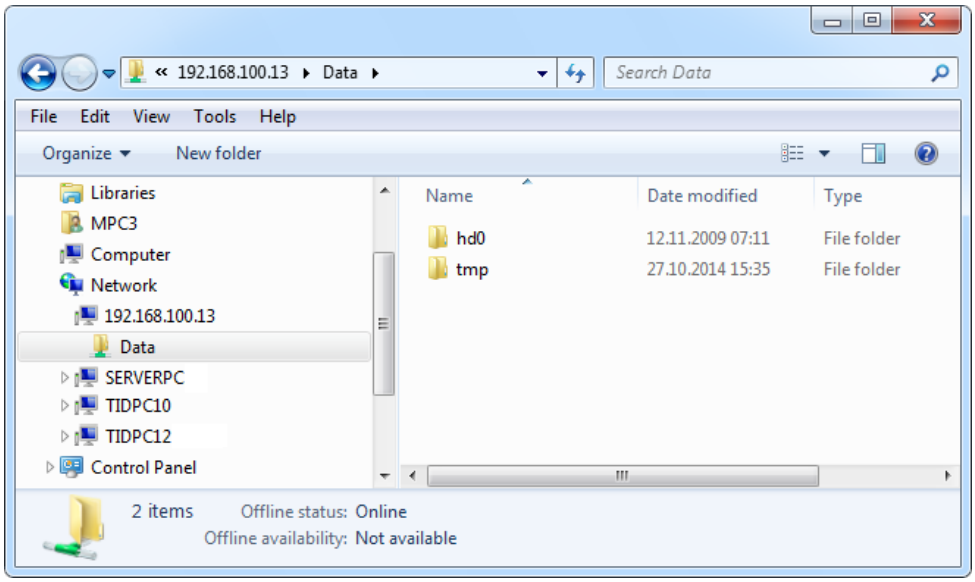



*Fig. 8-5 Internal memory of the Q.station as network drive.*

You can now access the drive just like any other network drive and copy or move files, etc.

Alternatively you can also select the menu **Extras -> Connect network drive** in any Explorer window (Fig. 8-6).

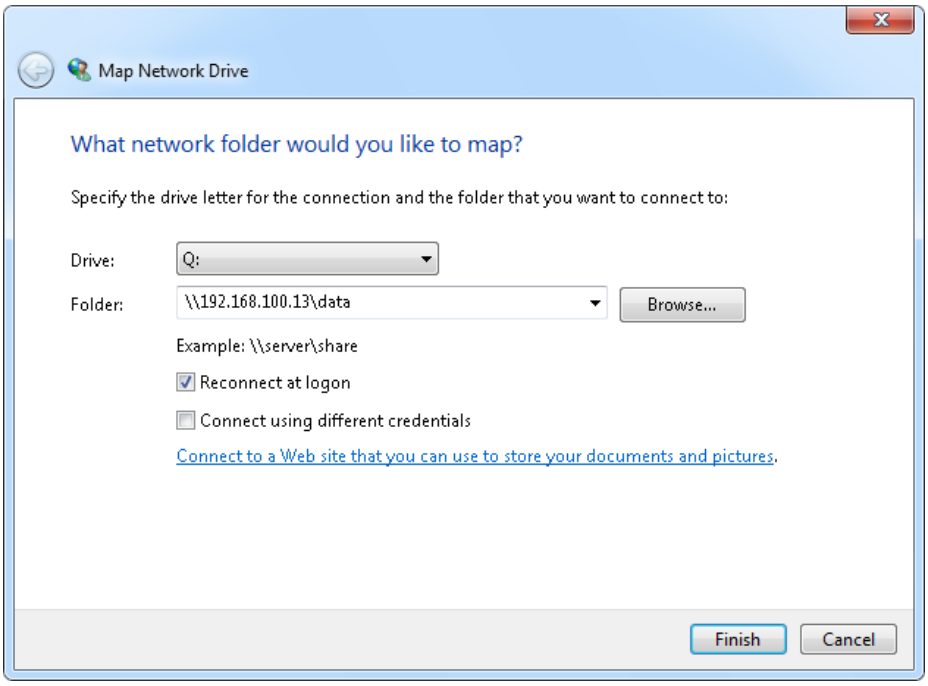



*Fig. 8-6 Linking the Q.station as Drive Q.*

Then, you obtain, as in the first case, the login dialog (Fig. 8-4), in which you have to enter the user name ***data***) and password (***data***). Then the internal memory is shown as hd0 on the drives of your PC.

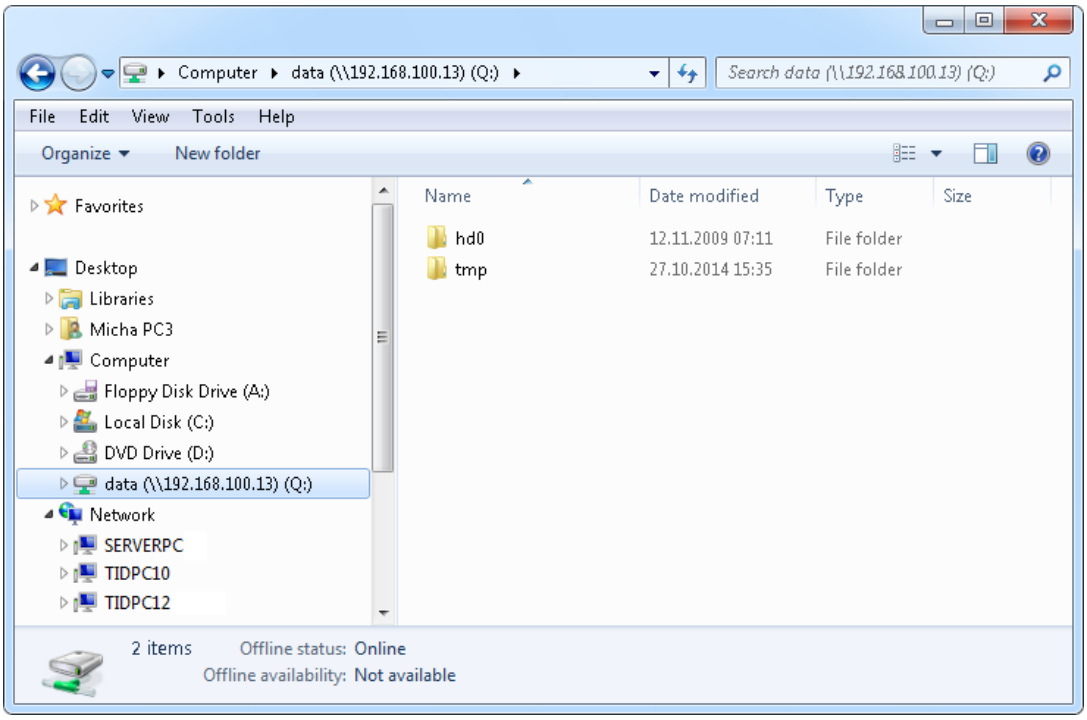



*Fig. 8-7 Drive Q contains the internal memory hd0.*

Now you can also directly access (with both methods) the data directly with test.viewer and test.node. With test.node you can even check the logger settings.

## 8.2 Remote control by VNC

The following section explains how you set up a remote control using TightVNC in order to be able to operate a Q.station 101 D or DT using the PC.

Download the program TightVNC (freeware under GNU General Public License Version 2) to your computer.
http://www.tightvnc.com/download.php.

➡ Note that the various installation programs depend on the operating system.

Then install the program (refer to Fig. 8-8 for an example).

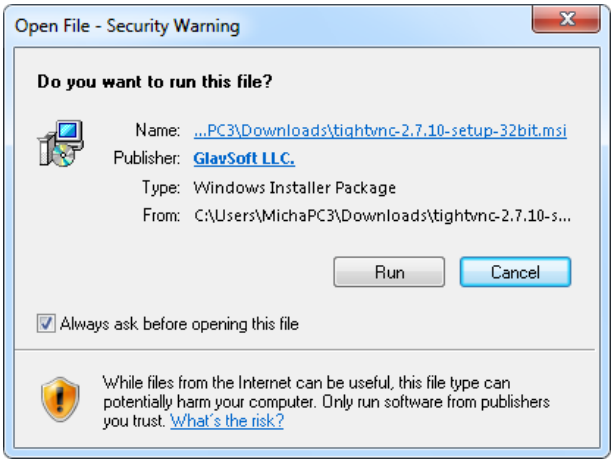



*Fig. 8-8 Installing TightVNC.*

You only need the TightVNC Viewer to be able to remotely operate the Q.station display. For this use the installation type ***Custom*** (Fig. 8-9).

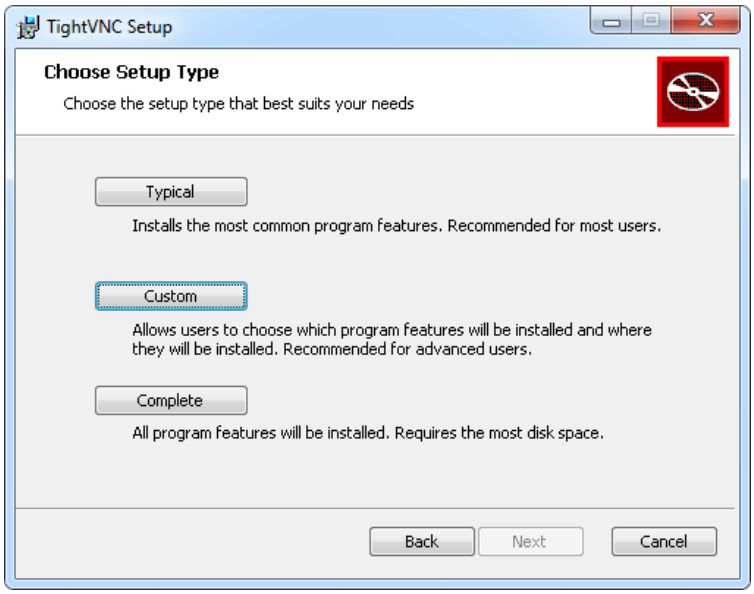



*Fig. 8-9 Custom installation.*

You then have the possibility of installing the TightVNC *Viewer* (Fig. 8-10).

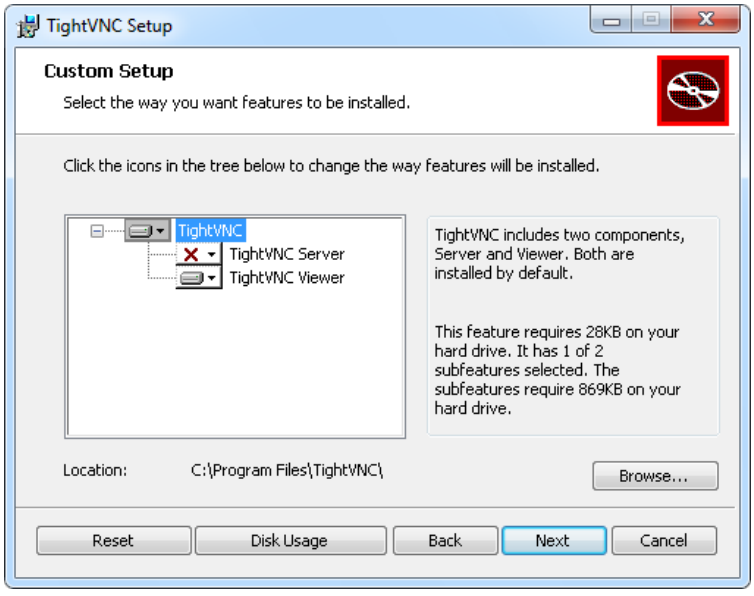



*Fig. 8-10 Installing the viewer.*

Follow the further instructions of the installation program.

After installation start the program and enter the IP address of the Q.station (Fig. 8-11).

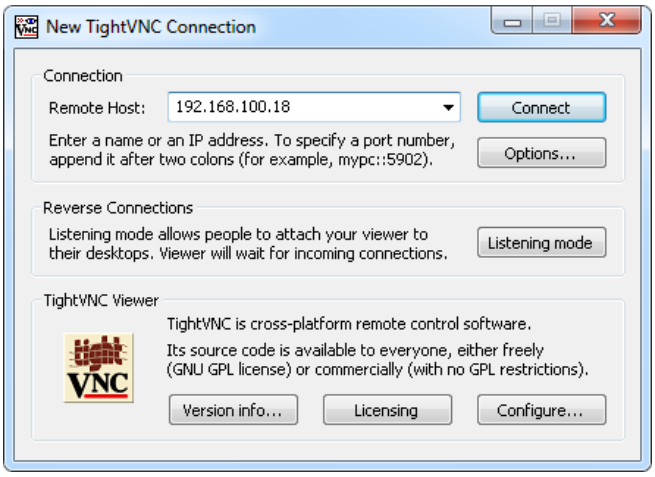



*Fig. 8-11 Logging onto the Q.station.*

In the next dialog enter the password ***master*** (Fig. 8-12).

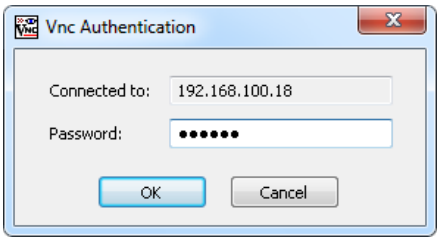



*Fig. 8-12 Entering the password.*

Then the display on the screen is shown in a window and you can operate the Q.station by clicking onto the fields as with tapping onto the display (Fig. 8-13).

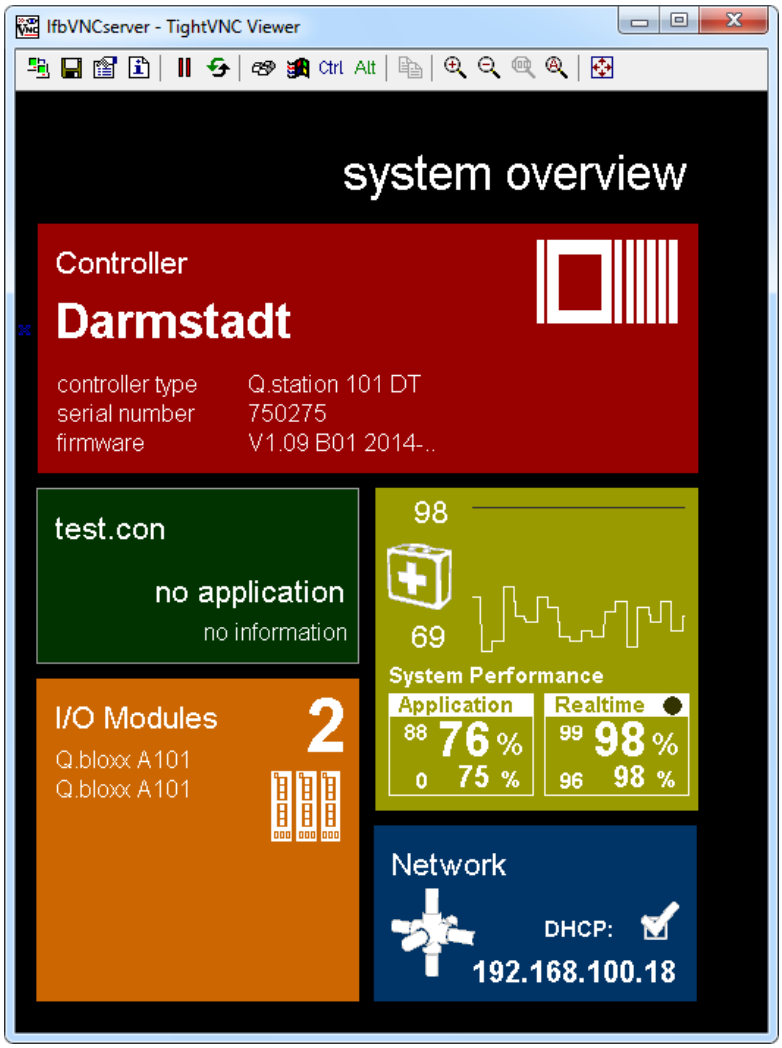



*Fig. 8-13 Display of the Q.station in TightVNC.*

Of course, you can also use other VNC viewers. Enter the login data used above at the appropriate points.

# 9 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/dokuwiki. The user name is ***support*** and the password is ***gins*** (not all sections are open to the public).

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