Technical Information

First steps - set-up of an e.bloxx system

A. Find out the optimal topological set-up by using e.commander.
How many modules can be connected to each serial line of the e.gate?

B. Address all modules of each line using the pre-configure tool.

C. Mechanical installation and connection of power supply and serial bus.

D. Configuration of the modules

1. System Overview

The product family e.bloxx is a modular multi-channel measuring and I/O-system. There are two hierarchal levels. Level 1 is the measuring and I/O level, level 2 is the data and controller level.

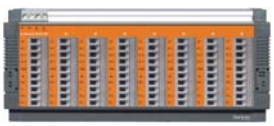
1.1 Measuring and I/O level

All e.bloxx modules like e.bloxx A1 or e.bloxx D1 belongs to level 1. The functionality of all modules includes A/D conversion, signal conditioning and a serial bus interface RS 485.

Each connection terminal (channel) of a module has its own bus address. When connecting the e.bloxx module to an e.gate/e.pac each address at each serial bus (UART 1 to UART 2) must be exist only once.

e.g. A1-1, A4-1, A5-1, D1-1 — default address 1

e.g. A1-4, A3-4, A4-4, D1-4 — default address 1 - 4



A1-8 — default address 1 - 8

1.2 Data- and Control Level

The data concentrator e.gate and the programmable automation controller e.pac belong to level 2. These modules fulfil the master functionality for the total measurement and I/O system with further functions like data storage, data synchronization as well as Profibus-DP and Ethernet interface.

The modules e.gate and e.pac provides 4 serial module interfaces (UART 1 to UART 2) to connect a group of modules at each interface. The used protocol is a time optimized binary protocol (Local Bus), the baud rate is max. 1.5 MBaud.

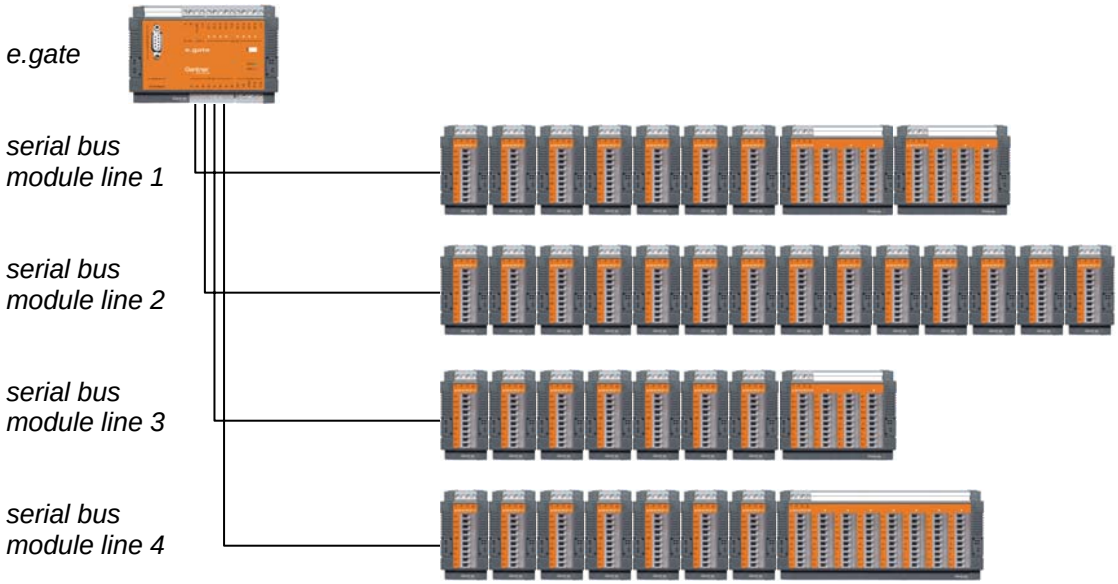
Data concentrator e.gate

2. Necessary tools for the first mechanical and electrical set-up

Hardware:	Interface converter RS 485 / RS 232 e.g. ISK 101, ISK 200 Serial interface cable ICL 106 (part of delivery) Bus connectors ICM 100 Bus termination blocks IBT 100
Software:	e.commander (demo version is sufficient for offline setup) Pre-configure tool (Gantner freeware) Both software tools are available on CD or at http://gantner-instruments.com/en/5_downloads/index.php

3. Typical multi-channel set-up of a test stand

In a typical test stand application a lot of different measurement and I/O signals have to be acquired. A high number of e.bloxx modules can be connected to one e.gate. The exact number differs depending on the kind and number of variables per module, the data format (REAL, INTEGER, BYTE) and the required data transfer rate.



Typical set-up

4. Connection of the e.bloxx modules

Each module has beside the plugs for the measurement and I/O signals a 4 pole screwing termination to connect the power supply and the serial interface. The meaning of the terminals is:

A	positive RS 485
B	negative RS 485
+V	positive power supply 10 to 30 VDC
0V	ground power supply

Power supply and serial interface of an e.bloxx module

The multi-channels modules have the same terminals each housing. But there is a separate address each cahnnel.

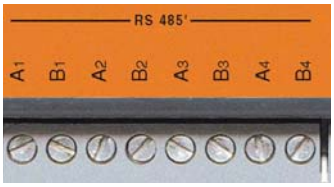
The earthing connection at the backside of the modules has to be used to reach a good EMC behaviour. Especially at measurements with high requirements regarding accuracy, solution and

stability a clear and consequent earthing concept is necessary. In case of use screend cable the screen has to be connected to the module earth too.

Attention:
The serial interface connection A and B meets the standardized connection, but the assignment of the Profibus-DP is not compatible to this standard. A change of A and B is necessary. Using the modules with e.gate/e.pac this matter is not relevant.

5. Connection of the e.gate / e.pac

These modules have the 4 pole screwing termination to connect the power supply too. But the serial slave interfaces for the connection of the modules are located at the lower termination row and are named A1/B1, A2/B2, A3/B3, A4/B4.



4 serial interfaces for the connection of 4 lines of modules

Because the modules will be connected via the 4 UARTS, the connector ICM 100 may not be used at the e.gate/e.pac.

6. Set-up step by step

Step A: Find out the right module distribution per module line

First of all the topology has to be defined. The distribution of all modules to the four serial bus lines should be done in a balanced way. In case of a split of fast and slow measurements, the fast channels should be grouped at line (UART 1). A random mix of fast and slow channels in each line will pull down the system performance.

The maximum connectivity each line can be calculated or tested by support of the e.commander. As already mentioned it depends on the number of channels, number of variables, data format and the required data rate.

Calculation:
Each of the 4 slave interfaces (UART) can handle 256 byte frames. The frame length can be calculated by

Frame length = (no. of modules x 5) + (no. of float var. x 4) + (no. of integer var. x 2) + no. of byte var

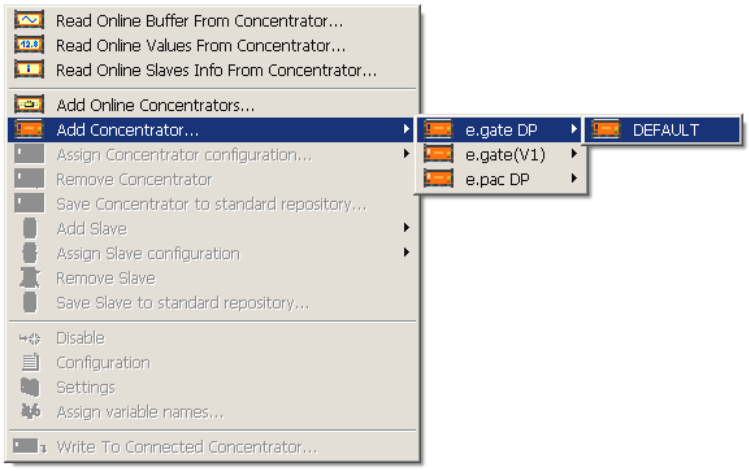
Example: 10 modules A4-1 (4 temperatures/module = 40 variables in float format - 4 byte)
Frame length = (10 x 5) + (40 x 4) + (0 x 2) + (0 x 1) = 210 byte => OK

Test by e.commander:
The e.commander supports this calculation during the set-up, checks it and allows/forbids the configuration.

The not licensed version of the e.commander can be used OFFLINE without limits and is available on the Gantner CD and from the homepage http://gantner-instruments.com/en/5_downloads/index.php

After installation the e.commander can be started and a project has to be named.

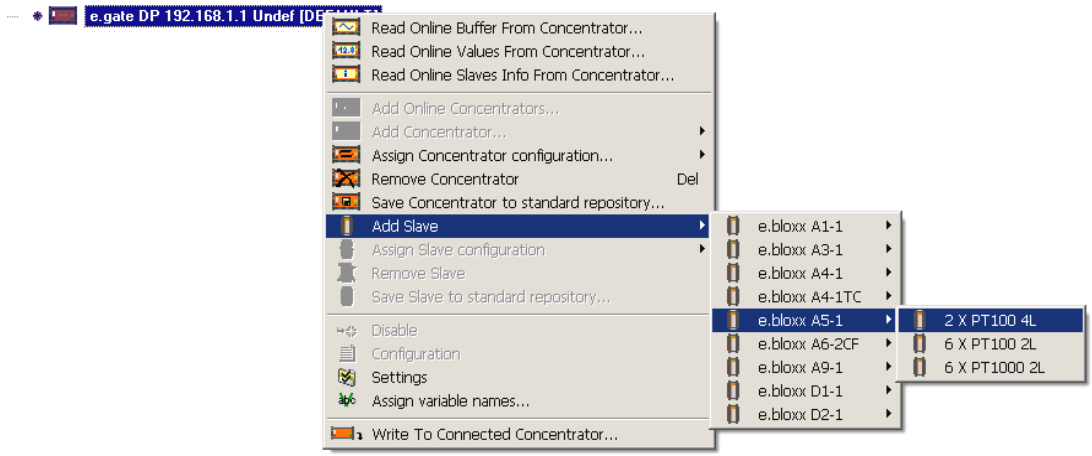
Click right mouse button in the white field to open the context menu



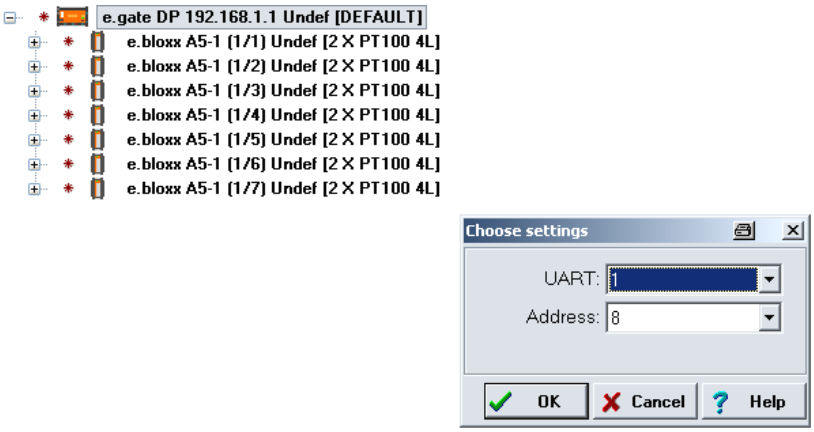
Now the data concentrator is visible in the sheet.

In the next step the modules can be selected for each serial bus line:

Click with the right mouse button of the data concentrator and add a slave (module). Use the available templates



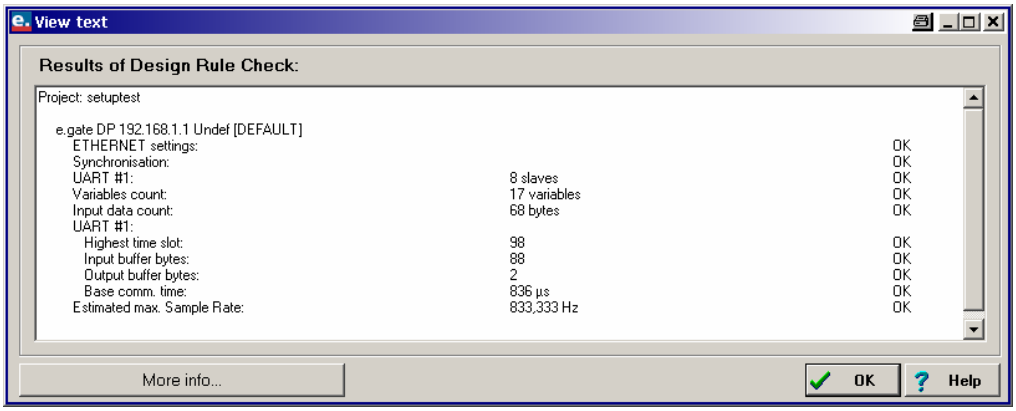
Now the slaves can be added module by module. e.commander is offering a serial line (UART) and an address starting at UART 0, Address 1



Should the address be changed later the function “right mouse button - Settings”.

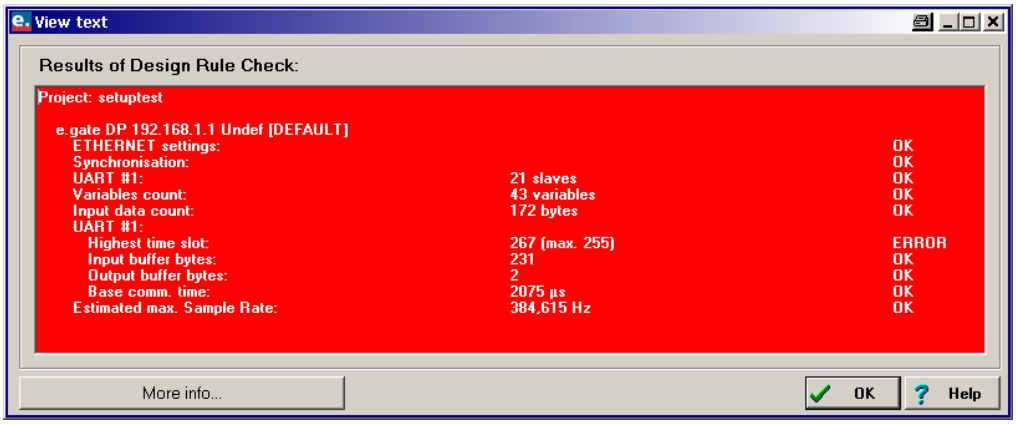
After adding a number of modules the check can be done by clicking on the information button and select “Check” in the next window.

Following information will be shown:

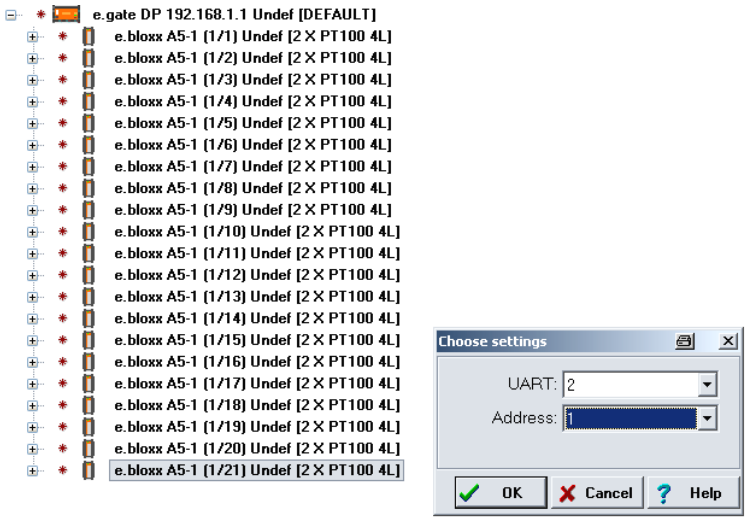


In this case the set-up is OK, there are 8 modules each with 2 channels plus time stamp resulting 17 variables and a sample rate of 833,333 Hz can be reached.

If the number of added modules is to high, than the window will show this following noticeable information. The software e.commander will not permit such a invalid configuration.



The next required modules can be set to the next line (UART), starting with address 1.



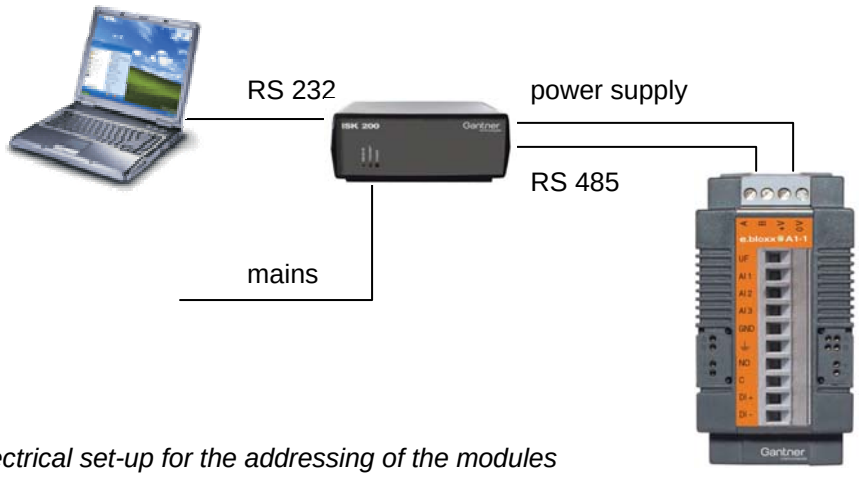
In this way it is possible to set up the whole test stand configuration. In the case that the number of channels increases the maximum numbers of modules in all 4 module lines (UARTS), a further e.gate has to be used. In this case the different e.gate has to be synchronized by connecting I/O 7 and I/O 8 of every e.gate. It is mandatory that the grounds of each e.gate are connected together. For configuration see the e.commander manual.

Step B: Addressing the modules corresponding to the module distribution

The result of the evaluation by the e.commander could look like the following example:

e.gate	UART 0	8 x e.bloxx A5,
		6 x e.bloxx A4,
	UART 1	10 x e.bloxx A4
	UART 2	10 x e.bloxx A3
	UART 3	6 x e.bloxx A1
		6 x e.bloxx D1

To address the modules, an interface converter e.g. the ISK 200 has to be used for the connection of the module to a PC and to supply the modules



Electrical set-up for the addressing of the modules

Notice: Is there more than one module function (number of termination rows) in one housing (e.bloxx A4-4 = 4 x e.bloxx A4-1) the module will have the relevant number of addresses, e.g.:

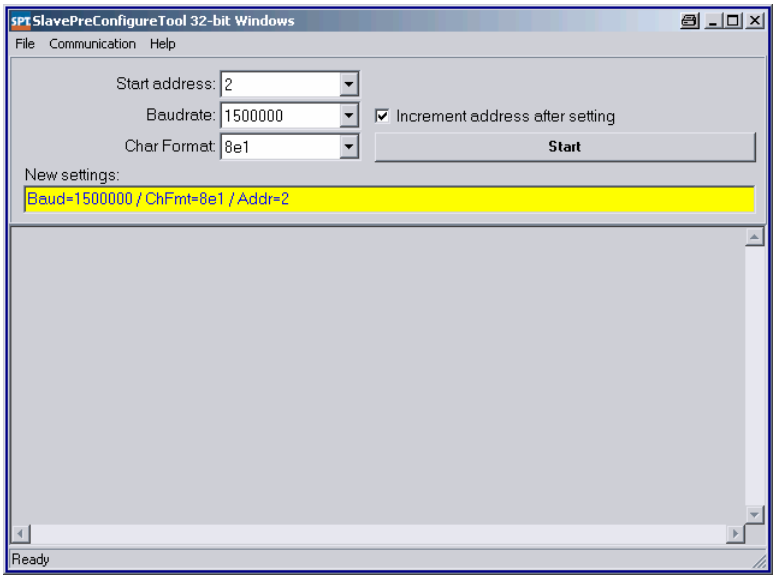
e.bloxx A4-4 4 addresses 

e.bloxx A1-8 8 addresses 

All modules are delivered with the default address 1, resp. 1-2-3-4- resp. 1-2-3-4-5-6-7-8.
The next step is the addressing of each module by using the SlavePreconfigureTool.

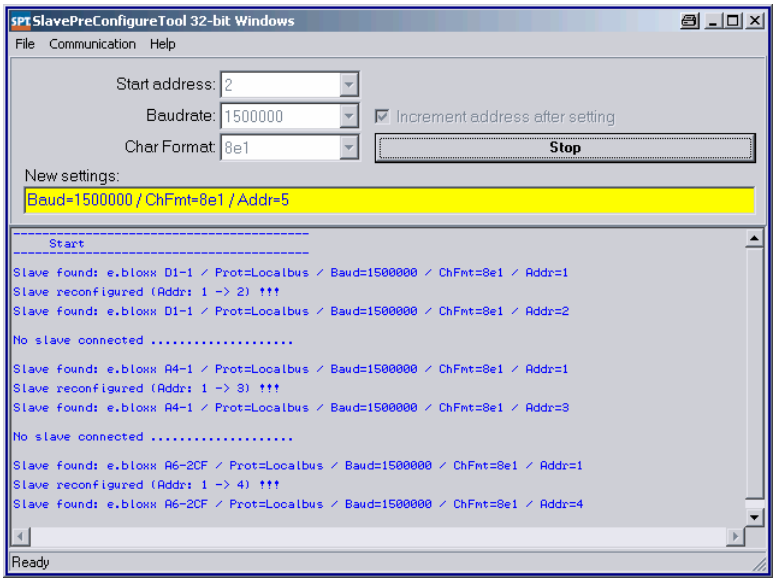
TIP: Starting with address 2 and reserving address 1 makes it easier to add another module with the default address 1 at a later time.

Starting the program this screen will be shown.



At first the Com Port has to be selected with the function Communication – Parameters …. After that the values for the starting address, the baud rate and the transmission format have to be fixed.

In the next step the Start address (usually 2), the Baudrate (usually 1500000) and the Char format (8e1) has to be set. By clicking the start button the first module can be connected. The online screen confirms address 2 of the first module, disconnect module 1 and connect module 2. After setting the address 3, the next module can be connected. Is the last module (above example: address 15) set and confirmed, click to Stop to finish the addressing process for the first line (UART).

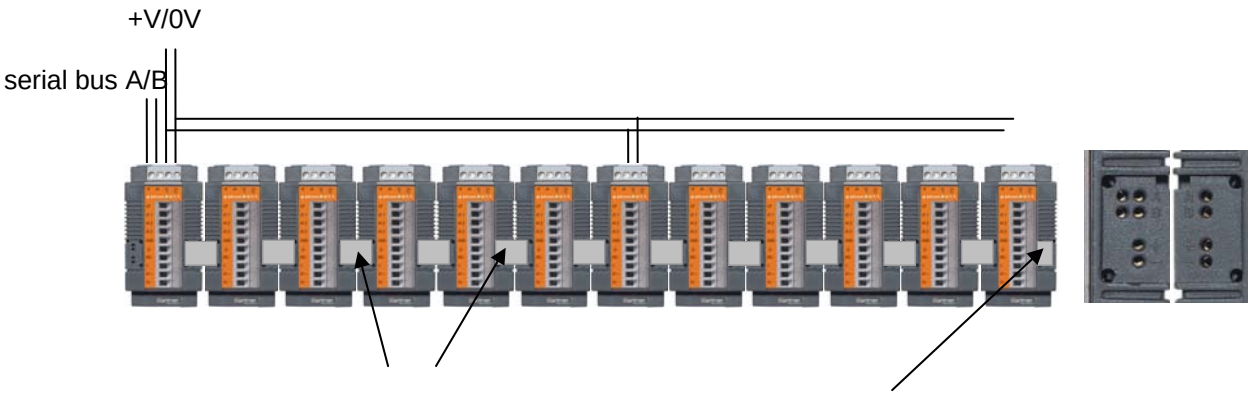


For the second line the procedure is the same. At first select Start address (again 2) and start the process as known. Connect each module of line 2 (example 10 x e.bloxx A4-1) one after the other.

Are all modules of all lines (UARTS) addressed, close the program.

Step C: Installation

After connecting the earthing contact the modules can be mounted on a standard mounting rail. It is helpful to use the following mechanical and bus structure:



The bus connector ICM 100 connects the serial bus and the power supply between the modules. But due to the power consumption it is not favourable to feed more than 6 modules via the ICM 100. In this case we recommend to connect the power supply direct to the module (see picture above).

In case of mechanical vibrations or shocks of the set up in general we recommend to connect the bus lines A and B as well as the power supply via the screw terminals not to use the connectors ICM 100.

At the end of the bus a bus termination avoid signal reflections. The termination only can be plugged at the right side of the modules from the point of the viewer.

Usually not all modules of one line can be set in one row. In this case the bus connection has to be done by wire.

Due to the very small sensor signals (e.g. at a Pt 100 a temperature difference of 0.01 °C corresponding a measuring voltage of 4 µV) we strongly recommend to lead each sensor signal between sensor and module in a separate screened low capacity cable. At multi wire cables a crosstalk is possible.

The screen has to be the same potential as the module (earthing).

In principle switching power supplies generate high frequent disturbing signals, which are over modulated at the output voltage. From our point of view it could be very helpful not to connect the minus pole of the power supply with the ground/earth of the module/screen. But this depends on the total set up and the type of power supply unit. A generally admitted recommendation is not possible.

One of the advantages of the decentralized structure of the e.bloxx series is the possibility to put the modules close to the sensor. This should be used by aiming accuracy, stability and less interference.

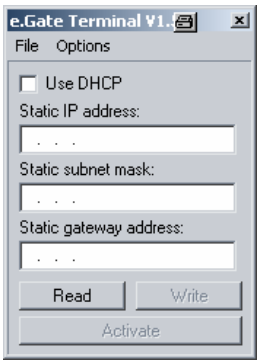
Step D: Configuration of the modules

After installation of the modules and the connection between e.gate/e.pac and PC is done, the configuration of the Ethernet interface has to be checked and if necessary changed.

In the default state the Ethernet interface is set active and the address 192.168.1.18 is set. So the module is prepared to be integrated in a network with DHCP server.

At a pear to pear connection without server the interface has to be set at DHCP passive. The connection between e.gate/e.pac and PC has to be carried out with a cross cable.

Set up of the Ethernet configuration:
Connect e.gate/e.pac via the serial cable ICL 106 (part of delivery) to the serial port of the PC and start from e.commander “Utilities - Concentrator Terminal…” the set up window. The actual configuration can be read, changed and written. After changing it is necessary to activate the changings.



After a successful network scan by using the e.commander the configuration of each single module and the system is possible. Because a manual is available this will not be subject of this Technical Information.

Detailed information about the set-up and the programming is available with the product documentation on the Gantner Instruments CD or the homepage www.gantner-instruments.com

In case of questions please contact

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